The Builder.

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Knole.

EVENOAKS and Knole are hard by. An hour on the London, Chatham, and Dover line, though the road is roundabout, with a short ride or a walk at the end, will take you there from London, to enjoy the quiet delights of a charming country and one of the most complete of the old Homes with which this England is sprinkled; a home full of quaint furniture and portraits of men and women whom the world knows. It is worth all the physic in all the hospitals to get away now and then into the country at this budding time. Who can resist the influence of a bright spring morning, the pure air as exhilarating as champagne and much more innocent? The blood flows, the chest expands, the spirits mount, difficulties are less thought of, troubles grow lighter, and to live is an enjoyment:—

> "Welcome every breeze and show'r;
> Sun that courts the blossom;
> Every new delicious flow'r
> Heap'd in Maia's bosom!"

The advent of spring is a perpetually recurring miracle. The blossoming of Aaron's rod once has been a marvel for ages: the annual blossoming of the earth, the periodic resurrection, is taken as a matter of course and little regarded. The present is a forward spring: the trees are in full leaf; the pear tree, as well as the cherry, has on its bridal dress of white, and the lilac, "many-plumed," is fully out and makes a glorious show.

Before going up to Knole the church may be looked at and into. A portion of it, at the west end, may be of the early part of the fourteenth century, but the main structure is later: the style Perpendicular of most prosaic kind. Amongst the monuments is one for Lawyer Lambarde, born in 1530, the earliest of county historians, and who also wrote "Eirenarchia." A book on Great Britain he put on one side because he found Camden was at work in the same direction; but it was afterwards published. He founded a school in Greenwich; and in a church in that town, now destroyed, this monument originally stood. A little bit of printing, however, preserves there the memory of his good deed. Writing is a more formidable opponent to Time than marble and stone. Geffrey Whitney, one of the Emblem writers of the sixteenth century, puts this truth quaintly:—

> "Then what may laste, which time dothe not impeache,
> Since that we see these monumentes are gone:
> Nothing at all, but time doth ouer reache,
> It eates the steele, and weares the marble stone;
> But writinges laste, though yt doe what it can,
> And are preseru'd, euen since the worlde began."

Another monument in Sevenoaks Church, one at the chancel end, gives us a grievance. The mention of it may, by chance, put things right. It records how Sir William Boswell left money for various good works, including the foundation of scholarships in one of the universities, and for apprenticing a certain number of poor boys of the town to handicrafts. The scholarships and other stipulations appear to be kept up; but inquiry forces us to believe that poor boys are not apprenticed. Admit that circumstances may have led to extra calls upon the funds, still there is no reason why the *poor* boys should bear all the loss, and we invite the parish authorities forthwith to "look to 't."

The School of Sevenoaks, founded, at the beginning of the fifteenth century, by Lord Mayor Sevenokes, who had his name from this town, where he was found when an infant, is understood to be a good one. Presently Sevenoaks will be brought even nearer to London than it is, by a new line of railway. The shafts by which a required tunnel is being formed may be seen from the well-kept gardens of the Royal Crown; whence, too, is had a good view of part of fruitful, beautiful, and story-full Kent (in British times, perhaps, the Caint or open country), including Kippington Park, now occupied by Mr. John Jay.

However, we must not longer tarry by the way, but get up to Knole; and, taking no count at present of the park, wherein we can ramble on our return, pass through the noble gate-house into the first court or quadrangle carpeted with grass: then, through an opposite archway to the second quadrangle, paved, and so into the great Hall of the house. In going through the courts, notice how the leaden rain-water heads are drawn out in length, with ornamental form, so that the pipes may come down midway between openings, or otherwise symmetrically; which would not be the case if they were placed directly under the mouth of the gutter. These courts, collegiate in character, have an air of repose which is soothing. As Tennyson sings,—

> "This look of quiet flatters thus
> Our home-bred fancies."

We have no intention to describe the house or its contents: this has been done again and again. We would but gossip and incite. Let us, however, in a dozen lines, say with the guide-books that Knole was one of the many palaces belonging to the see of Canterbury, having been purchased in 1456 by Archbishop Bouchier, who rebuilt the greater part, if not the whole of the house, and left it to the see in 1486. After Cranmer, it came into the hands of King Henry VIII.; and, after changes, Queen Elizabeth, in 1603, granted the reversion of it to Thomas Sackville (the poet), afterwards Earl of Dorset, whose family have since retained possession of it, though, for a short time, in the reign of Charles II., it was alienated. The first earl formed the Hall, a handsome apartment with richly carved oak screen, now painted and varnished! The interior generally was then re-arranged and fitted up; and, from that time to this, with additions made in the next reign or two, it has remained a well-preserved specimen of a seventeenth-century house. This, with the remarkable collection of portraits it contains, including some by Vandyck and Holbein, constitutes its chief attraction. It exhibits no great architectural beauties, and the rooms are, for the most part, low and plainly fashioned; but there it stands, an untampered-with piece of past time with many associations. Things valueless at first, become priceless as time passes: as Schiller writes,—

> —— "Time consecrates;
> And what is gray with age becomes religion."

"And who," says an acute friend at our elbow, looking through the rooms, "who is forming a nineteenth-century house? Surely all that we are now doing in the way of furniture and pottery, carving and painting, though it may be in the shape of revival only, would interest those who come after?" No doubt of it; and such collections are being formed here and there, though with no view, perhaps, to the pleasure and advantage of posterity.

Sir Humphry Davy wrote of neighbouring Penshurst:—

> "Through thy deserted chambers I have walk'd,
> Musing on elder times,—cheering my mind
> By memories of the great and noble dead.
> Within thy walls the first high spirits breathed
> Who, through the darkness of the feudal times,
> Threw the bright light of letters and of arts,
> And to the warlike temper of the age
> Gave softness and the charms of social life."

This may be too lofty praise for Knole; but the latter has a long list of illustrious names connected with it, from the Earls of Pembroke, the Bigods, the Says, Protector Somerset, and Dudley Earl of Leicester, down to Tom D'Urfey, the wit, who wrote "Pills to Purge Melancholy," and lived there for some time. His portrait, and a little picture by Vandergucht, showing him carousing with some of the household, while the artist behind a curtain makes the sketch, records his connexion with the house. In the Dining-room, where these hang, are portraits of Dryden, Congreve, Pope, and others, who were visitors to the last earl, as well as of Reynolds, Goldsmith, Garrick (all by Reynolds himself), Handel (by Denner), Ben Jonson, Swift, Addison, and many other literary celebrities, with an interpolation of more recent time, Sir Walter Scott. Of Baron Theodore Mayerne, the eminent physician, for the destruction of whose tomb in the vaults of St. Martin's-in-the-Fields a lament was uttered in our pages, when speaking of Mytens lately, there is also a portrait. After serving Henry IV. of France Mayerne, came to be physician to King James I. of England, who made him *Sir* Theodore.

Shutting your eyes, it is not difficult amidst such associations to bring down these wits and poets from out their frames, to fill again with their forms the handsome old chairs placed against the wall, and to hear something like what their conversation in jovial hours may have been. They would stare at Sir Walter, but Dryden and some of the others would have to give thanks for his praise when they knew him. At one of the meetings here, if tradition deceive not, when Glorious John was present, the company were to try who could write the best impromptu, and the poet was named the judge. The first he read was the earl's: "I promise to pay Mr. John Dryden on demand the sum of 500*l*.,—Dorset:" and he thought it unnecessary to read the others before giving his verdict. The story has been often told; but, as serving to bring the men before us, will not be thought a vain repetition.

The Brown Gallery contains a number of historical portraits, some of them good, and some of them not; the whole, however, teaching if nothing else, contentment; since they say, with tolerably loud voice,—

> "A little rule, a little sway,
> A sun-beam in a winter day,
> Is all the proud and mighty have,
> Between the cradle and the grave."

Why, then, repine? Why, then, envy?

In this same gallery is a portrait of Ninon de l'Enclos, at the age of seventy, and looking more like twenty-five. Ninon, the Aspasia of her time, lived till ninety-one, and died in 1706. Two or three of the best heads in the gallery, by the way, hang near hers. In the Spangled Bedroom there is a well-carved ebony cabinet.

In the Leicester Gallery are several pictures, amongst others, by Mytens, of whom fresh information was given in our pages recently. His copies of some of Raffaelle's cartoons are in another part of the house. The well-dressed housekeeper calls him My-tens, as do some better authorities; but so he was not called during his life; as may be seen in all the warrants referring to him, and other documents of his time, such as the register of St. Martin's-in-

the-Fields, wherein the name is invariably spelt, from the sound, Myttens or Mittens.*

By the side of the fire-dogs in the Cartoon Gallery, by the way, are two small figures of Asiatics, carved in wood, and with the drapery from below the waist painted like life,—carved so vigorously and painted so harmoniously that they leave a vivid impression on the mental retina.

The chapel is poor; in the ante-room there is a good ancient carving of the Crucifixion, including a number of small figures: the expression in many of them is excellent. This group is further interesting from having belonged to Mary Queen of Scots. In the Crimson Drawing-room, with some other very good pictures, hang the Ugolino, an Infant Samuel, the Robinetta, and the portrait of Madame Schindlerin, all by Reynolds.

The King's Bed-room, so called from having been fitted up for James I. (notice the remarkable picture of this weakly king in another apartment), has a bed that cost 8,000*l.* at that time, and was once handsome. The hangings of gold and silver tissue, lined with satin, have now, however, lost all their beauty. Handsome beds and hangings were used in England as early as the fourteenth century, if not before. Allusions to them are often found in the romances of the period. Thus, in Syr Bevys, of Hamptoun, mention is made of—

> —— "Beddes of silke echon,
> Quiltes of gold thar upon."†

And so in "The Squire of Low Degree,"—

> "Your head shete shall be of pery pygt
> With dymondes set and rubys bryght,
> When you are layd in bed so softe,
> A cage of golde shal hange alofte."

The large picture in the King's Chamber is by Janssens, and represents Gaspard de Coligny, the noted Huguenot admiral (who was slain during the massacre of St. Bartholomew, 1572), and his brothers. Two days before the massacre he had been shot at by the instigation of the Duchesse de Nemours, but was missed. The silver ornaments with which this chamber, as well as some of the other apartments, is adorned, are ineffective. There are several pairs of andirons or fire-dogs (called in old inventories aundhyryns, andirnes, and hawnd-iryns), in various parts of the house worth notice, especially those in the hall, which were brought from Hever Castle, and are marked with the initials of King Henry VIII. and Anne Boleyn. The antique statue in the hall, by the way, called Demosthenes, is fine both in pose and in respect of the drapery.

Before we again pass out into the park, let us offer praise justly due to the present possessor of Knole for the care that is given to the preservation of the pictures, and the way in which the house and its interesting contents are surrendered during several days in the week for the enjoyment of visitors.

The park is nearly six miles round, and contains some noble trees; while its undulating surface shows sheets of vivid green, spotted with clumps of foliage, with troops of deer (notice the white ones), passing noiselessly across the glades and in amongst the trees. It was a good-natured old lady who came back on her road, thinking we were strangers, to point out to us where the shell of a mighty oak, called "old" two centuries ago, would be found, and where stood the noted beech-tree,—truly, a glorious growth, and nearly 30 feet in diameter. We shall have carried on the obligation if by this note we lead any of our readers to search out for themselves these monarchs of Knole Park.

* See p. 309, *ante*.
† Quoted in Parker's "Domestic Architecture."

THE DESIGNS FOR PROPOSED MUSEUMS, SOUTH KENSINGTON.

In order that certain grounds of objection by some of the authors of designs, in the matter of the award of premiums in the competition for the proposed buildings at South Kensington, as well as our description of the drawings, may be understood, we preface the present notice with a statement of particular conditions amongst those issued by the Office of Works, that were not completely given in our first article.*

The designs required, were stated, first, as to be "for public buildings to be erected on the land," "used in 1862 for the International Exhibition" (excluding the ground occupied by the Annexes), shown by a plan whereon the site to be treated was coloured red; but, second, that which was wanted was particularized thus:—"The buildings for which a design is required are to be placed on the eastern portion of the site coloured red," &c.; whilst, afterwards, it was mentioned, that in designing the buildings for the particular accommodation of the Natural History collections, and the models belonging to the Commissioners of Patents, architects were to have reference not only to "future extension" for these purposes, but "to the ultimate appropriation of the whole site" for museums for "exhibition of various objects of art and science," and were "to show upon the annexed plan" (that before referred to), "the manner in which they would propose to lay out the whole site in such buildings." In a following paragraph, "the eastern side of the site coloured red" was again named, in connexion with the scale for the principal drawings and the scale for one elevation, and with "one perspective view tinted with light-brown Indian ink;" and in another paragraph, each competitor was required to "submit designs for the two museums, and a block plan embracing the whole site," &c. It has followed from these instructions, that some of the competitors have kept their museums as much as possible eastward of the central line of division between the eastern and western halves of the entire ground, and that many others have considered themselves at least restricted from trespassing at all upon the western half of the ground, with any portion of the Natural History Museum, or Patent Museum, and their adjuncts. All such competitors would consider those designs which treat, primarily and comprehensively, the whole site, and even those which in any degree pass the central line in providing the accommodation, as exceeding the fair limits of the conditions.†

In the following particulars of designs, as in the descriptions we have already given, where we speak of *the general plan*, we refer in each case to the competitor's arrangement of the ground east and west; that is, the whole area between Exhibition-road and Prince Albert's-road, and bounded on the south by Cromwell-road.

The design marked "Pro Rege et Lege," which has received the third premium, and is by Mr. Cuthbert Brodrick, has the general plan with each line of frontage set back considerably, excepting in the case of the theatre, which is at the north-east angle of the ground, and comes close up to Exhibition-road. The Cromwell-road front consists of a recessed centre and two wings. The eastern wing, of which the principal front is in Exhibition-road, is appropriated to the Natural History Museum. In the centre of the general plan is a rotunda, 180 feet in diameter, having an ambulatory round, and proposed to be appropriated to the Patent Museum. Therefore if the design that has received the first premium errs against the conditions as they are viewed by some of the competitors, in placing its theatre and its only adequate entrance-hall, centrally, or half in the western portion of the ground, the design now under notice must be considered to err similarly by the position taken for its Patent Museum. But it errs otherwise as to the circular hall. This rotunda of 180 feet diameter, is covered with a dome which is a mere shell in thickness, is very low, and therefore would have great thrust, and is pierced (judging from the section), with some hundreds of openings. The drawing is wanting in accuracy in all that relates to the openings; evidently, contrivance of the dome with reference to practicability could have formed no part of the competitor's labours. In the design that has received the first premium, indeed, it is not easy to understand that the abutment to the dome is sufficient, or how the lantern is carried, or what is represented by certain lines in the section: moreover, the lighting, about the rotunda below the dome, seems to be all by "borrowed light." As to the design that is more immediately before us, the wing or building on the eastern portion of the ground, appropriated to the Natural History Museum, is divided by a wide central corridor into two large areas. Each one of these is again divided into square spaces, nine of which in the centre, have each a circular lantern or domical light carried by arches and pendentives rising from slender piers. The division or bay next the external walls, on three sides, forms part of a corridor; and at each angle of the building, the plan includes an octagonal, chamber or "tribune," in a square pavilion. Externally, all the pavilions are richly decorated, and have attics with caryatides. The centre of the eastern front, and the centre of the recess facing the Cromwell-road, project; and the projection is flanked by pavilions, so as to give somewhat the effect as in the new French Opera House, whilst between them is a peculiar form of pediment with enriched mouldings. The general design is a compound of Florentine Italian and modern French. There is some good rustication in the lower story; where the windows are arch-headed, and there are festoons. In the story above, columns are used. There is considerable merit about the decorative features of the design: though many of them are more or less directly copied from models. The theatre much resembles one of Mons. Hittorff's circuses.

The design with the motto "Dieu et Mon Droit" is a very clever one decoratively regarded, in spite of a resemblance to Schinkel's Theatre at Berlin, and to some other buildings in the same city. The general plan is comprised mainly of two square blocks, forming wings in the Cromwell-road front, and a recessed centre. In this front, the end blocks appear each with a portico of six columns, over which is a great attic, with pediment; whilst a vast hall in the centre, has for its principal feature, a portico of eight columns. This hall is joined to the wings east and west, by a covered way; and at each of the two points of junction rises a lofty dome. Looking at the quadrangular block which is in the eastern portion of the ground; if the area be divided into nine squares; if the central square be given to the theatre, and the other squares be supposed each lighted by a central court, covered with glass, that will explain the general principle of the planning of the museums. We do not see that certain parts of the building would be adequately lighted from the courts, since there are no top lights. The general decorative features, besides the porticoes of Corinthian columns, are pilasters, angles formed by a double breadth of shaft and capital-decoration, a frieze with the names of eminent naturalists, a balustrade with pedestals carrying some form of ornament, a podium, and interpilasters filled in with an arrangement of mouldings separating the two stories, and with a window in each story, composed of two lights with a central shaft or anta. The general decorative treatment, and some of the details in the elevations, are excellent.

In the design marked "Mæcenas," the general plan shows a road 120 feet wide, across the ground, to afford a southern entrance to the Horticultural Gardens. But any advantage to be derived from the access, would be reduced, as the plan is, by the arrangement of the screen at the entrance from Cromwell-road, where the archways are insufficient. The lecture-hall is placed at the north-east corner of the ground, as in many other designs, and rightly so, in order that it may be used with or without the museums or library. In arranging the museums, the author claims to have kept in view the two important ends,—economy of space; and sufficiency of light. As he says, to meet these requirements, top-lighting is employed generally in his design; and he submits that this method is the best for the purposes of a museum. Our previous articles will show that we should be far from admitting any such view. He has endeavoured to provide an area of light-transmitting medium, or surface, as nearly as possible equal to the area of the museums, saying that the alterative would oblige resort to "wells;" which he thinks are to be avoided, by reason of the damp or lack of fresh air which are to some degree "accompaniments of confined quadrangles of whatever area." According to these views, he arranges a building filling nearly the entire eastern half of the ground, as two large covered areas, each 365 feet by 155 feet, and having a lantern in the centre, of 70 feet span, carried with the roof, by iron columns. A gallery on the first floor, surrounds

* See p. 289, *ante*. See also pp. 305 and 303.
† We are asked to mention that the perspective drawing alone of the 1st premiated design was coloured by the gentleman named in our last. The others were coloured by Captain Fowke's assistants.

the lantern-lighted central space. In principle, this is the original Crystal Palace arrangement; and he omits to consider not merely the superior advantage of side-lighting, but facilities of ventilation which are to be set against the disadvantages that he perceives in open courts. As to all these Crystal Palace arrangements of plan, the use of iron columns either as rain-water pipes, or as supports in a building intended to be fire-proof in accordance with the conditions, should not be for a moment thought of. Lastly, all the forms of the bazaar, or Manchester warehouse, are quite opposed to the requirements of those who go to study a collection; as they are opposed, we have reason to believe, to the views of the officers of the British Museum, who would prefer small galleries, or least of all, arrangements adopted in so many of the designs under the influence of Great Exhibition buildings. Decoratively regarded, the design marked "Mæcenas," has details of ornamentation which are not in bad taste. The general character is Renaissance Italian. Much of the enrichment is introduced in chamfers to windows, and on the lower portion of shafts of columns; but the best ornamentation is that of the lights of the windows, where the glazing is strengthened by standards of metal-work. The author's misconception of requirements in planning, however, is shown by the manner in which he would side-light his Patent Museum. This portion of the plan ranges along the Cromwell-road; and there are windows in front only; though the light would have to travel 50 feet. The contrasted merits and defects that are to be met with in the same sets of drawings in this collection, give a curious presentation of the state of education in our profession, a state which representative bodies are even yet but little alive to.

The design marked "Bramante," we thought fit to name in our first article, but not because it deserved precisely the notice which it has since received. The author seriously proposes to build, over the whole of the vast area of his general plan, a costly substructure of rusticated masonry, rising some eight or ten feet above the ground line, and of which the advantage may be estimated when we say that, excepting one or two places, windows are avoided in it. Its intended office is to impart effect to the more enriched portion of the building to be set upon it. In this, the author has *chosen* (we wish architects could be persuaded not to *choose*) the style of the Early Renaissance "because of its ready adaptability to the wants of modern civilization, and because of its capacity to incorporate or ally itself with the excellences and peculiarities of both the Gothic and the severe Classic styles." In the Cromwell-road front he proposes a curve inwards in the centre, in the form of a large flat segment. Internally, the arrangement of the museums includes roofing in wide and narrow spans, and the use of iron columns.

The design marked "Consilio et Labore" attracts some attention from the French appearance, both of the drawings and the design. The merit of the design however is not very great. The details and many features of the decoration are taken from the well-known Bibliothèque de Ste. Geneviève, by the Pantheon, Paris, and from the Palais de l'Industrie. In the general plan, the system of large open courts is adopted; and the buildings of the museum have the merit of being all side-lighted.

In the design with the motto "In Domino Confido," near to this last, the general plan seems to provide a way to the gardens, as in a design already mentioned. The eastern frontage is divided between the Patent Museum to the north, and the Natural History Museum which occupies the south-eastern portion of the whole site. The main features of this latter museum, are two oblong divisions, each with central glass-covered well-hole, and the two connected by corridors at the north and south, the whole enclosing a quadrangular space wherein would be the block containing the theatre and entrance. The upper galleries are both top-lighted and side-lighted; and their decorative features internally, include iron columns carrying arches, the spandrels of which would be ornamented with busts in circles. The chief features in the exterior are salient columns coupled, and roofs of high pitch.

In the design marked "Theta," the space between the two-storied blocks of the museum-galleries, is roofed over to get a ground-floor gallery, as in several other designs, but thus sacrificing the basement. Pavilion-masses at the centre and angles, columns superimposed, (and in the centre coupled, as well as in a portico,) are the decorative features.

There are some designs which are very peculiar decoratively, and in their arrangements for lighting, yet to be noticed. One with the motto, "One more Attempt at Design out of the beaten Track,"—and the features of which remind us of the plates in a work by a Liverpool architect, wherein endeavour is made to grasp the idea of a new style,—has the museum arranged mainly as two parallel buildings, each of which has the plan and section of clerestory-lighted nave, aisles, and lofty triforium-gallery. Each bay presents seven windows in the clerestory, and three arches in the triforium and aisle respectively; and the same character is repeated externally in the Cromwell-road front, the feature of the centre only of that line, being a loggia of five arches, and each wing having a bold arch as its central feature. In the eastern front, the ends of the two museum buildings appear, with the clerestory setting back in each case, and the buildings separated by a loggia of three arches. To the north, the Patent Museum is terminated by a lofty tower. In general arrangement of masses, and as to some of the details, there is much skill evinced in this design: though there are details, as those of the crowning balustrade, which are new rather than studied. At the opposite end of the Royal Gallery, there are two designs, one marked "Delta," and the other "Josephus," which adopt for the museums, modifications of the nave-and-aisles arrangement. They are difficult to describe in words; but the first of the designs has each block of the museum arranged in two stories, whereof each story has a central nave, and side galleries cutting across the windows; the galleries in the top story being lighted from the ceiling. Of course, all such arrangements, like that of the Crystal Palace system, are open to an objection before referred to. In the design marked "Josephus," there are two stories in the central division; or there may be said to be a gallery over the clerestory-lighted nave; whilst in the lower portion of the section, a top-lighted triforium appears with its outer walls set-in, so as to leave space for lights to chambers which are in the position of aisles. Externally, the set-off or set-in space where the lights occur, is divided by buttresses formed as *chimeræ*. The decorative character of these two last-mentioned designs is the same, a mixture of Florentine with Venetian-Italian, and Gothic, having some good features, but strangely at variance with any manner of building in our day.

Near to these productions is a design marked "Spectemur Agendo," wherein the museums are arranged partly with the long narrow courts and partly with large quadrangles. It has some good decorative features in arched principals, and the coffer-lights of ceilings; and in details of the exterior, which are of Romanesque or Renaissance character, where coloured marbles are introduced. Some of the internal decorative features resemble those of the shafts and arches of metal-work in the courts of the South Kensington Museum.

The design marked "Deo Gratias," has the general plan with a centre recessed with quadrants, whereof each is completed to a circle having its separate roof. One rotunda would be the "theatre," of which the galleries and roof would be supported by iron columns. The effect of this design as in the perspective view, is better than would be supposed from the details. These are of Italian character. "Regardez" has a general plan having a recessed centre and large courts; but the Natural History Museum is arranged with iron columns carrying the roofing in alternate wide and narrow spans. The light is admitted through double glazing in the roof. The design attracts some attention from the perspective drawing of the exterior, which is cleverly tinted in sepia, and emphasizes some of the masses and details effectively. The general character is Italian. The angle-pavilions are terminated by lanterns; whilst the centre-pavilion has angle-turrets and a loggia in the first-floor. In the upper story, the general character is given by coupled columns, and plain walling in place of windows. A certain blankness in a story thus treated, seems to have been perceived by the colourist of the view; for, he has indicated pictorial decoration on the wall-surface between the columns. "Lux" is an Italian design, with curved roofs; and it adopts the system of large areas with top-lighting, in the case of the museums. "Fides" is distinguishable chiefly as of red brick, with a portico in stone. "Theta Gamma" is remarkable in the general plan, for an open circular court, surrounded by a peristyle reached by four covered ways, to be appropriated for sculpture and called "Temple of Fame." The general requirements of the building seem to have been carefully studied; but the decorative features, which are Italian, are not very good. A design marked "Y. Z. &," is Italian with an immense square domical roof as the central feature. There are hints to be got from the details of degenerate Italian character of the design marked "A. Z.;" though such forms ought not to be copied. A lofty tower in the centre of the front is a main element in the design. The drawing is not good. "Mon Droit" has one commendable feature of plan in the central corridor with the galleries opening out, right and left; but the basement would be sacrificed, as in other cases, by appropriation of the space between the two-storied divisions, to the divisions of one story in height between them; whilst the rusticated podium is liable to the objection brought against the basement in another design, and from which the design that has received the first premium is not free, that the omission of windows makes use of the substructure or basement out of proportion with cost. The decorative character of "Mon Droit" is given by pavilions with roofs of high pitch, ordinary arch-headed windows in the upper story, and pointed-arch-headed windows and narrow rusticated piers in the lower story.

We have spoken of two or three designs as Gothic in some of their decorative features. There are two other designs which are markedly Gothic. One labelled "Nature and Art," has arches and cusping such as were in vogue half a century ago. The other, "Amor Patriæ," is noticeable for the manner in which its masses and high-pitched roofs are piled up, and for its sculpture introduced in the horizontal space between the windows of the ground-floor and upper story. The buttresses at the entrance, also, are terminated by carved representations of animals, some of them very prominent by dimensions.

Two designs, of unequal merit, in the collection, are of Greek character. One of them, with the motto, "'Tis well to begin well: 'tis better to end well," has the general plan formed of two large blocks of building separated by a deeply-recessed centre, having a portico of eight columns at the end. Each wing in the Cromwell-road front has three peculiar features in the upper story, which may be described as tetrastyle porticoes with the intercolumns filled up. They are certainly not elegant: the whole upper story, without windows, has more than the usual blank look of the method of treatment; and the ground story must be badly lighted by the small windows that are shown. The other design, marked "Athenian," has great merit of grouping in the masses, which include Doric temple-formed structures raised aloft, each main portico carried on a substructure having one long opening filled in with dwarf shafts of Indian character, and a larger opening filled in with Telamones or elephants. The portico is reached by side flights of steps. To the main block of the temple-formed structure, another block transeptwise is attached. The principal portion of the building devoted to the museums, has for its external features, plain openings between antæ or pilasters in the upper floor, and low windows, with Greek doorways at certain distances, in the ground story. A square tower rusticated in horizontal lines, and having marked *entasis*, and terminated by a lantern and balcony, is placed at the north-eastern corner of the ground. There is fine effect in this design; though it had no chance of selection.

The design marked "Aspiration," the author of which, not generally known as an architect, discloses his identity where he speaks of the stone that he would recommend, is of classical character; and its towering masses at angles and centres, and a large dome in the middle of the plan, give the building a grandeur of outline which is only too far removed from realization. In adopting the character described, the author has been governed by the fact of the area, more extensive than that of any building that can be readily called to mind as within the precincts of a town: but, in common with many other competitors, he has not remembered the disadvantages of a site so closely shut in. These would render unattainable the effects here shown, or such as belong to a perspective view supposed taken from the usual distance. The rotunda below the dome, is the main feature of the plan,

having sixteen openings and lines branching from it.

The design marked "Atom," has a dome 256 feet in diameter, and is mainly remarkable for having been mentioned in the House of Commons as evidence of asserted extravagant character of the designs generally. The mention of such a design as specimen of the works in the competition, is evidence of what is the fact, namely, that very little real attention has been given to the exhibition by members of the legislature; and had not our description extended to extreme length, we could say much respecting the evidence which is added to that which we previously had, but which the profession seem to be unmindful of, touching the habitual manner of looking at architectural designs.

We are authorized to state that the competitors who are willing that their names should be affixed to their designs, exhibited anonymously in the Royal Gallery, at the Palace at Westminster, should communicate with the Secretary of the Office of Works, 12, Whitehall-place, London, S.W.

THE ROYAL ACADEMY EXHIBITION.*

IN all probability, if matters proceed as they lately have proceeded, style, as indicative of the painter, will become extinct in one comprehensive system of representation. Even in our picture-books of the present day one has to seek for the recognition of an illustration beyond any information individuality would afford, since the orthography of the respective pencils defies distinction, everybody being so like every one else, more especially those who, imitating all that they can imitate—namely, the bad points of the best of them at their worst,—produce a curious anomaly of monotonous confusion.

No two styles could, perhaps, afford a stronger contrast than the all-sufficient one of Sir Edwin Landseer, implying so much more than it asserts, and the purely assertive one of Mr. J. F. Lewis, equally inimitable in the absence of any proof to the contrary hitherto. To those who consider the perfection of finish the one thing necessary in a picture, what a triumph this marvellous transcript of positive fact must be. (110) "The Hôsh, or Courtyard of the House of the Coptic Patriarch at Cairo," introducing as immediate incident the patriarch dictating despatches, for which Arab messengers are waiting to convey them—as is intimated by the catalogue's description—to a convent in the desert. It would appear impossible to exceed the close imitation of reality in this without meeting the extreme; for, curiously enough, its excessiveness already suggests incompleteness; and everything represented as supposed to be alive is killed by it: the pigeons and ducks hang suspended and inanimate under its cruel dominion; when, on the other hand, the walls, tesselated pavement, and all such objects are nearly alive in their expressiveness and exquisite finish, and seem to be the only things that can breathe in such utter want of air and space. As—

> "A jest's prosperity lies in the ear
> Of him that hears it,"

may not the Shakspearian aphorism be transposed to another sense, and a picture's success depend entirely upon party judgment, irrespective of general opinion, and not so much upon the maker's effort to secure it? Looking with astonishment at Mr. J. F. Lewis's wonderful performance of minute elaboration, it is impossible to divest oneself of a certain respectful awe similar to that entertained for devotees to barbarous religions and their horrible ordinances, with whom new shirts were no luxury and flagellation frequent; and ask if this photographic fidelity to exact imitation is the true faith after all, or but an illusive one indeed!

However it may be, such sincerity in its worshipper entitles him to the highest consideration, and even those most inclined to question it must deferentially bow in admiration of its very intensity.

How refreshing it is after this to look at the green dewy grass in Mr. Hook's equally real landscape (105), "The Broom Dasher." He is another who relies upon realism,—upon judgment in selection rather than imagination,—for provision to expound upon; and though he has nothing on the present occasion that will compare with many of his more notable works of preceding years, his skill always agreeably educes the full value of the lessons constant intercourse with nature teaches him; and whatever he does proves how valuable a classic art-education is, even in the simplest application of it. (146) "From under the Sea," is the most striking of his contributions; but though he has selected fresh ground for observation, or rather gone under it, for the purpose of change, he has got on to no new track in his tramway picture, for we have the same utopian fond parents of the same freckled fair-headed bairns, as demonstrative of a most delightful appreciation of domestic happiness in Cornwall, as in former blest localities, somewhat precocious, but always most pleasing. There is more poetry in (445) "Cornish Miners leaving Work."

If recollection be worthy of any credit at all, why did Mr. Goodall, R.A., desert for desert sake his pearly complexioned Irish beauties and piquante Brittany peasants? With such a made and matured power of impressing them as he now may boast of, what a fund of result might be expected from his old happy method of investing historiettes of village life and interests with motive realization and artistic value in their depiction. His large and thoroughly well painted study of Eastern circumstance (397), "The Messenger from Sinai at the Wells of Moses," can evoke no compensating return for the amount of labour and knowledge so evidently bestowed upon it. Too much a matter-of-fact representation to be prized for historical associations,—as it has no pretensions for assuming any particular incident of Biblical narration,—the interest attached to its locality is destroyed by its subservience as merely a background for commonplace reality. The highest praise that can be awarded it is, that it might have been painted by Horace Vernet, if the solidity of its execution did not at once refute the supposition. (294) "The Song of the Nubian Slave" is most admirable for character. This is Mr. Goodall's diploma work, deposited in the Academy on his election as Academician, and rather an unusually strong attestation of acknowledgment. Mr. P. H. Calderon has been unfortunate, too, in the choice of subject-matter. It must be an affected taste or idiosyncrasy that could prefer so lugubrious a picture as the "Burial of John Hampden" (204), conspicuous as it is for many superlative qualities, to the far more attractive performance of this artist last season. The theme is unpromising enough in the hands of most consummate ability to contend with it; and since Mr. Calderon has failed to make anything of it beyond a most impressively oppressive exhibition of his rare manipulative attainments, and exquisite feeling for appropriate effect, it may deter others from similar attempts. The throng of Puritan soldiers in their sombre costume, although most cleverly diversified by individual portraiture, might surely have been further relieved of some of the heaviness and repetition that fatigues the spectator without commensurate advantage in assisting the painter to tell his story; and surely there would have been excuse for the introduction of female figures, considering how endeared the Garibaldi of that period was to the families of his supporters and dependents, and how enthusiastic so many fair Puritans were in the cause for which he fell. Another contribution by the same, more lucidly illustrative of his *forte* (264) "In the Cloisters at Arles," presents a pair of buxom washerwomen, very brilliantly coloured.

It is much to be regretted that a speciality such as belongs to Mr. Armitage and Mr. Watts in common should for want of opportunity remain almost dormant. From their introduction to public notice, they have loyally adhered to a predilection for monumental art; and, in spite of little encouragement beyond general acknowledgment of their aptitude, have so persisted in practising it as far as possible, even to the exclusion of a more profitable adaptation of their capabilities, that it amounts almost to a reproach to deny such a chance of development, where so much promise subsists, whenever it may be practicable to call them into requisition. (15) "Ahab and Jezebel," by Mr. Armitage, fully sustains this promise of ability on his part. The two impersonations are admirably expressive of the text descriptive of Ahab's greed and Jezebel's intention to satisfy it at the price of murder. The breadth of its treatment and simple arrangement of composition are singularly characteristic of this artist, who always depends more upon his Academic knowledge than artificial accessories, although such ornament as he does introduce is always well studied and appropriate. Perhaps to its surroundings may be attributed some of its want of force in colour, which appears to be detrimental in proximity to more elaborated and glowing exercise of it; but it claims a position for itself quite independent of its size.

Mr. Watts is less fortunate than usual in (437) "Time and Oblivion,"—a design to be executed in divers materials after the manner of Phidias; but he has already established himself as a master of all necessary requirements for mural decoration. In (395) "Choosing," a beautifully-painted head, the grace and power which distinguish it sufficiently proclaim the same author.

* See p. 325, *ante*.

THE LOCOMOTIVE BOILER EXPLOSION AT BISHOP'S ROAD STATION.

LAST Monday morning the echoes of the Underground Railway reverberated to a boiler explosion. The boiler of engine No. 138,—one of the locomotives supplied day by day by the Great Northern Railway administration to that of the Metropolitan,—exploded with apparently two loud reports. The Metropolitan Railway Company, in consequence of some delay in the delivery of the eighteen engines ordered in Manchester for the traffic of the line, has at present no engines under its direct control, but they are hired, together with the *personnel*, from the Great Northern Railway Company. This particular engine was built by a well-known Newcastle firm. It is six-wheeled coupled; the wheels, originally 5 feet in diameter, are now turned down to 4 feet 11 inches; the distance between the centres being 7 feet 6 inches. The cylinders are now 16¼ inches, and with a 22 inch stroke. The inside length of firebox is 4 feet, its breadth 5 feet 5 inches, and its depth from top of bars, 4 feet 6 inches. The copper exhaust-pipe is 4½ inches outside, and the boiler is 9 feet 9 inches long, with a thickness of plate of 7-16ths of an inch. The plate-iron steam dome is 2 feet 1¼ inch in diameter inside, and it was placed on the centre plate between the smokebox and the firebox. This ordinary goods engine, worked for several years on the Great Northern, had been adapted to the requirements of underground traffic by fitting it with an arrangement for conveying the steam back into the tender, and by placing a damper in the smokebox.

The engine had just come into the station, and was ready to start with the 9·15 train. It appears that the driver cannot say to a certainty whether he had or had not opened the regulator-valve and let on the steam. He had, however, opened the whistle, which had been heard to blow; and it is to be presumed, as most engine-drivers are in the habit of opening the regulator and the whistle simultaneously, that the steam had been, at any rate partly, let on. The pressure-gauge only showed 110 lb.; and at a previous hour of the same day, the dial pointed to 120 lb.; while the gauge has been since tested, and found to be correct. About two-thirds of the top portion of, firstly, the plates of that portion of the barrel next the firebox, and, secondly, about two-thirds of the top portion of the abutting plates on which was riveted the steam-dome, were torn into shreds like brown paper, and separated from the barrel; while the plate-iron dome, probably weighing from 6 to 8 cwt., was thrown high into the air. The present appearance of the tubes is very interesting and peculiar. They are all bent in the middle, or under the former situation of the dome; and with a camber of from 6 to 8 inches,—that is to say, if a straight line were drawn from the centre of each hole in the tube plates, the distance between that line and the present centre line of curvature of each tube would be from 6 to 8 inches. It is remarkable how symmetrical have been the results of this action on the tubes. Standing on the top of the firebox, and on the centre line of the engine, the eye of the spectator will see a perfectly symmetrical distortion of the tubes towards each side of the engine, the highest curvature being coincident with a line drawn at right angles to the longitudinal centre line of the engine, and coincident with the cross centre line of the former position of the dome. It is evident that the explosion first took place here. The copper steam tube, of course placed along the longitudinal centre line of the engine, is completely bent and doubled back on the top of the plate adjoining the smokebox. Two or three of the brass flue tubes are also doubled back in the same way. They are swung back just as one might fancy a

bell-rope to be flung back by a jerk. The brass tubes present the appearance of a bundle of canes, each end of which bundle of fasces, after being tied together, had then been submitted to a bending force, end on. The enormous and, above all, *instantaneous* force, may be conceived when we observe that none of the tubes seem to have been much disturbed in their ferule holes. The engine was not in the least disturbed on the rails, and was left in its original position just previously to the explosion. This is a proof, if any were wanting, that the explosion acted vertically upwards. The reaction, or rocket-like action, due to the sudden exit of the steam and water, thus pressed the engine firmly down upon the line, and actually prevented its moving, while, at the same time, it broke the top plates of the springs.

A tolerably sound and sure way to get at the origin of the explosion would have been, as soon as possible after its occurrence, to have cleared the fragments of the plates from any dirt and mud, and to have set them up, near and parallel to the boiler, as far as possible in positions similar to their original positions. Thus, before any oxidation had set in, it would have been possible to judge from the appearance of the fracture whether there was any old spot; and the parallelism of position would have aided the judgment in forming a decision as to the originating cause. The weak place certainly seems to have been the dome seating. This is pretty clear, not merely from the upper direction taken by the explosion, but also from a look at the dome itself. The riveting seems to have required a terrible amount of drifting before the holes in the boiler and those in the seating would coincide, and some of the rivets are indeed inclined in opposite directions to each other. There is a suspicious-looking crack in the plate still adhering to the seating. The diameter of the dome is also rather above the usual average, as it is 2 feet 1¼ inch inside. The plates are not worn much more than one-eighth, which slight wear would not of itself by any means account for the affair; but anything of this kind in the neighbourhood of the dome-seating would have furthered the effects of any initial weakness. The fracture probably first occurred at or near the seating, and, of course, above the water-line. The superincumbent pressure was thereby released from the top of the water, which thus surged up instantaneously, and with a sudden load, on the dome and plates. The plates were completely torn from the dome, which was then thrown up, and the water, in its passage from all sides of the boiler towards the outlet, encountered the tubes, which were thus bent. The plates first felt the full force of the exploding water. All the appearances, indeed, very well bear out the very rational explanation of boiler explosions published a few years ago by Mr. Z. Colburn. The last word, however, has not been said on all the phenomena attendant on these occurrences.

It is a noticeable fact that an explosion, which seems to have begun at the dome seating, also took place last Thursday week on a locomotive boiler belonging to the Midland Railway. In this case the driver's brains appear to have been blown out by the impelled water, thus producing the same effect as water when it is discharged from a gun. The verdict returned by the jury was that the explosion arose from a "scarcity of water." Perhaps there was a "scarcity" of something rather rarer than water, and there is probably, also, such a thing as "drifting" into a boiler explosion, as well as into a European war.

NOTES OF THE PAST AND PRESENT PRACTICE OF MEASURING MASON WORK.*

THE attention which, at the present time, is being bestowed on the subject of this evening's paper by kindred and allied societies in England, the movement now in progress in Edinburgh for a revision of the mode of measuring masonwork, and the bearing which the subject has on the interests of several classes represented in this society, invest it with a degree of importance which may excuse, while it is to be feared it will not obviate, its dryness.

To trace the history of any of the arrangements for adjusting and settling the transactions relating to the industry or to the commerce of a nation would reveal much curious and instructive information.

How the weights and measures now in use, the systems of calculation, and the modes of valuing have been formed—by what steps they have proceeded to their existing state—how, and to what extent they have been affected by the idiosyncrasy of the people—by the habits of the times—by the degrees of intelligence which those who used them possessed—by their standards of integrity—by the nature of the material employed—by the modes in which these materials were sold to the craftsmen—by the arrangements with operatives—and, with regard to the works of artificers engaged in building, in addition to these questions, how the modes of measuring have been influenced by the changes in the methods of building, and by the various styles of architecture, are among the topics which naturally suggest themselves by the subject now to be considered.

The aim of this paper is not so ambitious as to attempt to elucidate these questions, some of which might be suitable for the consideration of our brethren, the archæologists; its object is simply to glance at the things of the past, and by connecting them with those of the present, to endeavour, however feebly, to excite attention, with the hope that existing evils may be removed in the future.

The keeps and fortresses, the castles and palaces, and the magnificent ecclesiastical buildings of the Middle Ages, all attest the advanced state of the mason-work of the period; but the existence of the feudal system, then in full vigour, with its villenage, its requirements of personal services, and its other accessories, prevented the necessity of any measuring for the purpose of valuation in the erection of these edifices; while in the towns the dwellings were generally composed of materials so fragile, and so rudely formed, that skilled artisans were not required in their erection.

It was not until the thirteenth century when, the extent and influence of the burghs having greatly increased, transactions relating to the erection of buildings were needed. It has been the work of the intervening centuries to bring these transactions to their present state. It is difficult to speak with precision regarding the subject prior to the fourteenth century,—and subsequent to that period, while the records of burghs are crowded with absurd enactments relating to the strength of ale, the price of candles, and of aqua vitæ, &c., the references to building operations are few and far between.

One method of executing masonwork 500 years ago was to hire workmen for longer or shorter periods at rates of wages fixed by mutual agreement; and it may be remarked that the workmen were engaged at different rates. The idea that the labour of all operatives in a trade is of equal value appears to be a modern discovery. The materials were purchased by the proprietors of the buildings, and furnished by them to the workmen. Contracts made in the fourteenth century are extant; and they were more frequent in the fifteenth century, some of these being for a year's services. Besides these formal engagements with workmen, entries such as the following, taken from the accounts of one of the Scotch burghs in 1453, occasionally occur:—

To the masonys for the makynge of the key	lib.	3	5 0
For II dusane of hewyne parpannys	lib.	1	8 0
For efter hewynge of fre stanys			11 0
To Gilbert and Dauy for steppis to the key			20 0
For a hunder band stanys			20 0
For stanys			6 0
Schenderis and sande			5 0
To Tyre for reddying of the founde			5 6
To Tyre and tua uther men to help the masonys			3 0
To drynke sylare			1 0
		£8	4 6*

Eighty years later, measuring was employed to determine the quantity of masonwork; and a formal contract, of which the following is a transcript, is selected as an early instance of the use of the Scotch standard measure for building:—

"At Abirden, the XX day of Februarr, the yeir of God, ane thousand V^c. XXXII. yeirs, it is appunctit, agreit, and finalie endit betwix honorabill men, Thos. Menzies, of Pitfoddelis, and Alex Gray, maister of wark to the town of Abirden on the ane pairt, and Pate Franche and Sanderis Monypenny, maisonis, on that uther part, in maner, forme, and effect, as efter followis, that is to say, the said Pate and Sanderis sall big ane blok-house on the sandness, of XXXVI. fuit of lynth, XVIII. fuit of breid, and VI. fuit of thiknes in the val, and of heicht as beis thocht expedient be the said maisteris of wark and masonis, with gun holles and dur of sistler, as beis thocht expedient be the saidis maisteris, and the houss to be bigit in the maist souer vise for sauite of the raid and bevin, as beis thocht expedient be the saidis maisteris of wark and masonis, for the quhilke the said maisteris of wark sal deliuer and pay the said masonis for euiry raid, three lib. Scottes mone and payaud for the hewandwark, the saidis maisteris of wark findaud them all maner of stuff neidful thairto, except sande and watter, and the saide maisonis to finde al maner of warkmene thairsellues, and to beguin the wark in al guidly haste. In vitnes hereof the saidis maisteris of wark hes subscruit this writ with thair handes, and the saidis masonis hes sett thair markis to the same, daye, yeir, and place forsaid."

A good deal of Scotch shrewdness is displayed in this contract. It is worthy of notice that there is no reference to a standard thickness for building.

Very well detailed specifications and contracts, extending to many pages of writing, for masonwork of buildings in the seventeenth century, are, unfortunately for us, totally silent regarding quantities and rates. The simple statement that the work is to be executed and completed for a certain sum, payable by instalments at certain terms, being the only information relating to the cost.

Extensive operations of the same period were executed by paying for the materials and for the labour. For examples: the masonwork of Heriots Hospital, Edinburgh, which was completed in 1642, was executed under the superintendence of a mastermason at the weekly wages of 6*l.* Scots, and a yearly salary of 100*l.* Scots in addition: the operative masons had 3*l.* 12*s.* Scots per week. Towards the end of the seventeenth century, masons at Dumbarton were paid at the rate of 13*s.* 4*d.* Scots per day; and there is an entry in the burgh accounts for 5,000 hewn stones for the bridge, which had been bought at the rate of 144¼ marks per thousand, or about 1*s.* 10*d.* Scots a piece.

The details of accounts for building to be found in burgh records of the seventeenth century are abundant; but, to the disgrace of the age, these are greatly exceeded by accounts, of the most minute character, of the expenses for burning witches, and it would be easier to ascertain the expense of putting a witch to death than it would be to find the cost of a rood of building.

It is somewhat ludicrous to find an account for mason work occupying nearly a page, the total amount being about 8*l.*, followed by the following, remarkable, among other things, for its brevity (in 1647):—

"For ane supper in Alexr. Ramsay's, with the prowest, and baillies, and commissioners of the Kirke, saxty-four pounds—64 lib."

When measurements of mason work became general, the practice, which still lingers in some parts of Scotland, of paying for labour by arbitrary allowances added to the true dimensions of the building, was general—levelling for wall-plates, &c., and measuring all the walls on the outside for their lengths, are instances.

Gradually, by slow degrees, so imperceptible as to be difficult to record, the system of measuring mason work in Glasgow, assumed the form of which the following, from an estimate for tenements built about twenty-five years ago, in the centre of the city, is a specimen:—

"2 feet ruble back wall with vents and polished jambs and all polished and back-filleted dressings, the back-fillets 9 inches broad, plinth and soles 8 inches thick, the outside work run in courses between the rybats, and clean pointed ..... Roods 13 24 0 0 at 160*s.*
2 feet ruble north mutual gable with vents and jambs on both sides in all the *stories*, polished chimney-head and sques. measured as it stands—
Roods 8 27 0 0 at 200*s.*
Cube stones in pillars of shop-front in solid courses—
Cubic feet 697 0 at 11*d.*
Do. in lintel course 14 inches on the bed—
Cubic feet 258 0 at 1*s.* 4*d.*
2 feet ruble backing of ditto ... Roods 0 12 0 0 0 at 80*s.*
Polished and moulded hewing of pillars and lintel course ..... Sqr. feet 985 0 at 8*d.*
2 feet polished ashlar front wall with vents and jambs per plans, and architraves and caps, &c., per elevation, above shop lintel course, the shop cornice and great cornice girthed into the height—
Roods 8 31 0 0 at 330*s.*"

By the present mode of measurement, and adopting the prices of the day, the cost of the back wall above mentioned, would be as nearly as possible one-half more, or 50 per cent. additional; and in regard to the front wall, the probability is that the increase would be even greater.

In the mode of measurement employed in the estimate from which the foregoing extracts are taken, the true lengths of the walls were reported, the front wall being measured on the outside, the gables within the front wall and over the back wall, and the back wall within both gables; but the heights were taken by girding all the projections, such as base, belt, and sill courses, frieze and cornices, to the line of wall, and gables to the top as if they had been built square, with, in addition, the half of

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* Read at a meeting of the Glasgow Architectural Society, by Mr. John Shields, measurer.

* It has not been attempted to institute any comparison of the value of money where it is mentioned in this paper, with its value at the present time.

the thickness of the gable added to its height. Brick has since been gradually substituted for stone in building gables of tenements.

The practice of including the valuable stones, and the labour, of such work as form the fronts of our street buildings, in the price of such a measure of quantity as the rood = 36 square yards, was most unjust; and, as might have been expected, this mode of measurement kept the tradesmen in a state of chronic discontent; while the rapid increase in the population and in the resources of the city, and the consequent great increase in the number and importance of contracts for building, attracted so much attention that, in 1814, the Incorporation of Masons framed a series of rules for measuring their work, of which the following are the more important:—

"1st. *Building.*—Building of every description, whether constructed of ruble or ashlar materials, to be first measured and rated as ruble wall.

5th. *Dimensions.*—The dimensions to include no more building than is actually erected.

8th. *Deductions.*—All apertures of doors and windows to be deducted from the building, the size of the daylight of each. When arched, the height to be taken to the spring of each arch only.

13th. *Hewn Work.*—All the hewn work of every description, however situated, to be measured and valued by the superficial foot or yard.

14th. *Hewn Materials.*—Materials differing in value to be classed by themselves, and rated accordingly.

15th. *Dimensions, Ashlar.* — The dimensions of ashlar and of work similar to be regulated by the surface, and it is to be understood that the breasts of the rybats and lintels to the bottom of the checks, and the sills 6 inches inwards from the check, are to be included.

20th. *Mouldings.*—Cornices and all other mouldings to be taken at the extreme points for the length, and girded across the mouldings, including the upper bed to the line of the wall for the breadth, all to be considered as moulded work."

There are twenty-seven rules and a concluding clause. It is worthy of remark that these rules were submitted to the Dean of Guild Court of the city, and sanctioned by it. Inquiries regarding the control exercised by Deans of Guild in various parts of Scotland warrant the supposition that their approval had not been applied for, out of Glasgow, for centuries.

A number of buildings were measured in accordance with the rules of 1814, but they were never properly established, and speedily fell into abeyance. The first rule relating to building appears to be stringent; it was not, however, held to apply to such work as pillars, &c., of shop fronts, insulated columns, lintels, &c., the stones of which were charged by the cubic foot without being measured as rubble, while such work as buttresses, turrets, and pinnacles of Gothic buildings were measured firstly as rubble by the rood, and then as polished work by the superficial foot, without any separate charge by the cubic foot.

In May, 1840, the mode of measuring masonwork, now in force in Glasgow, was agreed upon and adopted by the architects, measurers, builders, and incorporation of masons. There are in all twenty-eight rules, and the following are quoted as having been less or more subject to question:—

"*Building.*—1. Building of every description shall in general be first measured as ruble work, and classed according to style of work and value of materials. In particular cases, such as columns, pillars of shop fronts, and where heavy cube materials are used, the price may include both stone and building."

"*Openings.*—5. The daylight size of all thorough openings to be deducted from the building, whether arched or otherwise. No deduction to be made for vents, window bossings, or press recesses. The hammer-dressed scontions of thorough openings in internal walls, also returns of projected breasts, or exposed ends of detached walls, will be measured and classed, separately, by the superficial yard."

"*Hewn Work.*—11. Hewn-work connected with walls is to be charged for its additional value, over the price of ruble building. All hewn work of every description to be measured on the exposed surface, and classed and rated separately according to size of materials and kind of work. Circular hewn-work to be measured in the same manner as straight work, but classed separately according to quality. Where bevelled cuttings occur, such as at pediments, skews, &c., an allowance of 6 inches is to be given on each lineal foot of cutting.

Hewn Dressings of Ruble Walls.—12. The rybats and lintels of openings in ruble walls, are to be girded from the bottom of the back fillet, to the bottom of the inside check, and rated either by the superficial or lineal foot. If the latter, the girth to be stated, and, in either case, the price to include the broached tails. Corners, bases, plinths, and skews are to be taken in the same manner as the rybats. The window-sills will have one end projection added to the length, and the breadth taken 6 inches inwards from the check.

Ashlar Work.—13. All plain ashlar to be measured by the superficial foot; window and door rybats, and lintels, in ashlar walls, are to be girded to the bottom of the checks, and where these openings have upstart architraves, or side mullions, the ingoing of the rybat to be taken at the breadth of 6 inches. Window-sills in side walls are to be taken 6 inches inwards from the check for the breadth."

"*Mouldings.*—15. Cornices and other running mouldings to be measured at the extreme points for the length, and girded across, including the upper bed, to the line of the wall, for the breadth, as moulded work, and to be reported by the superficial foot, or lineally stating thickness and girth. Window and door architraves to be taken by the superficial foot, girding from the line of the wall to the bottom of the cheek, for the breadth, or to be taken by the lineal foot stating the girth.

Columns and Pillars, &c.—16. Columns, pillars of shop-fronts, buttresses, and similar work, where heavy materials are used, are to be taken by the cubic foot, and where said materials are not measured as ruble, the prices shall include for building. The hewing of such work is to be measured by the superficial foot for labour only."

"*Newals, &c.*—19. Stair-newals to be girded where hewn, and charged by the superficial foot, stating thickness; parpend ashlar walls to be measured in the same manner as newals. Note.—The prices of all parpend ashlar walls and steps, platts and newals of stairs, also hearths, pavements, skirtings, shelves, and similar articles shall be held to include building and laying, and not to be charged as ruble work unless particularly stated to the contrary."

"25. It is to be understood that, in all cases, the bevelling and washing of bases and soles, building or filling up savings, splicing window-breasts, plumbing rybats and scontions, clouring bossings of presses and recesses, &c., to a regular and equal thickness, and all matters of a similar description, required to complete the work as represented on the drawings, or described in the specification, and also the clearing away of all rubbish arising from the mason-work, shall be held to be included in the prices of the work without extra charge, unless a distinct agreement is made to the contrary.

26. It is likewise to be understood that cutting batt and dook holes and raggles, and executing the several jobbings required for the carpenters, plumbers, and other tradesmen employed at buildings, are not considered to be included in the prices of the work, but are to be charged separately, with the exception of cases where a special agreement is made in reference to the same."

These rules were in use for a short time after their adoption, but the wide estimating and the general increase of the expense caused by the introduction of so much detail, in place of the mode of measuring walls as they stood, speedily induced the people who had to pay for the buildings to discountenance them; and subsequently the new mode, as it is called, was only employed in the case of churches and other public buildings; many of the tenements which adorn the city having been measured and valued by the loose system previously in operation; and it was not until 1853 that the Glasgow new mode of measurement was definitely and exclusively adopted.

The clause in rule 5, "The hammer-dressed scontions of thorough openings in internal walls, also returns of projected breasts or exposed ends of detached walls, will be measured and classed, separately, by the superficial yard," leads to the supposition that the framers of the rule did not contemplate any separate allowance or measure for the scontions within the hewn work of windows and doors; owing, however, to the practice by some of the measurers of charging these scontions separately, it has become almost universal to add to the entries for rybats, &c., the words "including scontions." This practice is not quite correct, in so far as the inband rybats form the scontions which are thus described separately.

The silence of the rules in regard to the lengths of window-soles not projecting, *e.g.*, such soles as are common in Gothic buildings and in those of the old Scotch and the Elizabethan styles, has led to the practice by some measurers of taking the lengths of these soles only to the extent to which they are hewn on the upper bed; so that in fact a length of stone, in some cases amounting to 12 inches, for which the mason has paid the price of "long stones," is only measured to him as rubble building—with the measure for whatever kind of work the walls are faced with—and is a premium or inducement to furnish soles with as short bearings as possible. This remark applies equally to the lintels of windows and doors in buildings of the styles above mentioned.

For a considerable number of years after 1840, in cases where the new mode was adopted, the practice of charging cornices and similar work of cube materials attached to walls, by the superficial foot, for the extra value of the stone, over the cost of rubble, and for the labour in hewing, as provided by rule 15, was general practice. The 16th rule relating to columns and pillars, &c., was understood to have the literal meaning of the language employed; so that in the case of porticos, and similar erections entirely of cube materials, these were charged by the cubic foot for materials, and by the superficial foot for hewing on the exposed faces, without any separate measure as rubble, and frequently without any reference to building at all. The more general use of cube materials in the buildings of the present day, and the inherent justice of charging such expensive materials as cube stones, by the cubic foot, have gradually produced greater uniformity; so that it is now almost unknown to charge work executed of cube stones, merely by the superficial foot of hewn surface, in addition to the rate for rubble. The practice of measuring cube materials as rubble by the rood, and as solid stones by the cubic foot, besides charging the hewing of the exposed faces by the superficial foot, has also become more general; and the chief reason assigned for it is, that by this means payment is obtained for the labour in dressing the beds of the stones; by a species of equivalent this may be the case, but it is a clumsy expedient: it is well known that in Glasgow, the cost of the cartage of the materials which form rubble is more than half the cost of a rubble wall; and as the cost of cartage is added to the cost of the stone, when charged by the cubic foot, it is obvious that to give rubble, on its own merits, for these cube stones, is false in principle.

It would occupy more time than can now be afforded to refer with any degree of minuteness to several of the rules which have been quoted, *e.g.*, the rybats and lintels referred to in rule 13, are frequently charged in ways differing from that prescribed; the 25th and 26th rules, relating to jobbings, are somewhat intermingled in the present practice; removing rubbish being almost universally mentioned in estimates.

A brief reference to the practice of measuring masonwork in other places will conclude this paper.

Although there have never been rules printed and circulated in Edinburgh, the measurers there have rules in MS., which provide for allowances and methods of taking dimensions now become obsolete, so that they are very much a dead letter; the actual practice varies but slightly from that of Glasgow at present. In regard to cube stone, these are not charged as rubble when employed in porticos, gate pillars, &c. As already noticed, efforts are now being made to improve the mode.

In Aberdeen (the granite city), the walls are measured complete as they stand; that is to say, a wall faced with hewn work and backed with rubble is charged in one entry by the rood; the openings are not deducted; the dressings of windows, &c., are charged extra per lineal foot for hewing only; cornices and other moulded work are charged by the lineal foot stating the girth, or by the superficial foot; rubble walls and gables are measured without deductions, and the dressings, chimney heads, &c. measured for extra value over rubble; fireplaces and vents are not charged separately; cube stones are charged according to the sizes of the blocks, by the cubic foot, and the hewing on them by the superficial foot; cube materials are not charged as rubble.

In Dundee, the practice is similar to that at Aberdeen; the standard thickness of 2 feet for walls is not strictly applied.

In Dumfries, walls faced with ashlar are measured complete,—the openings are not deducted; the dressings are charged extra by the lineal foot; rubble walls are measured in the same way; cube stones in a rubble wall are measured in the first instance as rubble and then for extra value over rubble; but as there are no professional measurers, the practice varies considerably. In extensive operations the estimates are prepared in Edinburgh or Glasgow, but in other cases the tradesmen get the plans to measure for themselves, and make up their estimates in their own way.

In England, where freestone is comparatively scarce, and where consequently the buildings are more frequently of brick, masonwork does not occupy the prominent position which it holds in Scotland.

From the rules for measuring masonwork at the Houses of Parliament,—and they may be inferred to form, to a considerable extent, the method now in use in London at least,—it will be seen that the system is very minute, and that higher value is placed on labour than in Scotland; besides measuring the hewing of the exposed faces of stone, as is done elsewhere, the plain and sunk beds, plain and sunk joints, preparatory labour, grooves for cement, rebates, metres to mouldings and to sinkings, &c., stopped ends, punching holes, notchings for embrazures, perforations, &c., are measured or numbered. On the other hand, it does not appear that cube stones are measured as rubble.

In some parts of England the walls, where built of ashlar and rubble, are charged separately; that is to say, the ashlar is charged by itself at its true thickness, and the rubble backing is also charged at its thickness: thus a 2 feet wall faced with ashlar would be charged for ashlar, say 7 inches thick, and for rubble 17 inches thick. Considering the great difference betwixt the cost of these two kinds of stone, this method seems to be more just than is that of charging every

kind of wall firstly as rubble, but there would be some difficulties caused by its introduction, such as the payment for bond and other stones; which extend beyond the inside face of the ashlar, or the converse, of causing a multitude of deductions in taking these stones from the rubble.

It is desirable to have greater simplicity in the mode of measuring masonwork, in particular to have the system exploded of charging work as rubble in which there is not a particle of rubble; and it is to be hoped that the attention now being bestowed on the subject will produce greater uniformity of practice, and, above all, lead to ideas more just and enlightened.

THE INTERIOR OF A GOTHIC MINSTER.*

Stalls.—The chorus, or *schola cantorum*, was at first devoid of seats, the ancient discipline requiring a standing position (Stat. Poict., c. 1; Mart. Anec., iv. 1071). In course of time, the infirm at first, and then all the choir, were allowed a resting crutch (Ib., de Ant. Eccles. Rit., lib. iii. p. 9). Forms were used by the clerks (Stat. Linc., 1212; Lichf., 1259). Half the choir stood and half sat during the Psalms (Stat. Lichf., 259; Austin Canons, Mart. u. s., 297); or one between two sat at Psalms, Alleluia, Gradual, and Epistle (Ib., 307). If any could not bear the fatigue, they were to sit *in loco talibus constituto*. At Besançon, sitting during the Psalms was reprobated (Beyerlinck, Theatr., ii. 71). *Quod quidem juris et is nostrum habeat qui in choro existens corporali obstaculo nonnisi sessu frui commode potest.* (Comp. Stat. Ratisp., cap. vii., where only sitting, standing, and genuflexion are permitted in choir,—Mayer, i. 187; and Stat. Braunschw., c. lvii.,—ibid. 115; and "*Incurvi super misericordias aut super formas:*" "*reclinando super misericordias; jaciendo super formas,*" Martene, iii. 327.) Waterville at Peterborough, "*ordinavit chorum*" (H. Cand., 93), and W. de Lindsay, in the thirteenth century, contributed to the stall work (p. 199), which was covered with paintings of Scripture subjects. In the ninth century, benches were introduced by the more luxurious communities; and about the twelfth century, stalls, with their misericords, were introduced as a compromise to rest the canons without deviating from a standing position. The Early English benches may be seen at Rochester: three unique shafts, with capitals of gilded wood, are preserved at Peterborough. At Wells, the Early English stalls have been recently destroyed, and incongruous stone seats erected between the pillars, a plan followed with the stalls at Durham in the modern reconstruction. At Hereford and Winchester are stalls of the thirteenth century; at Gloucester and Ely of the fourteenth century; at Carlisle, St. David's, Ripon, Norwich, and Chester, of the fifteenth century; at Manchester, Beverley, and Bristol, of the sixteenth century. Perpendicular stalls remain at Cartmel, Sherborne, Selby, and Dorchester; of the Cinque-cento period, at Christchurch; Jacobean, at Wimborne; and of the seventeenth century at Salisbury and Durham. There are also some stalls preserved at Hexham, Hull, Peterborough, Ottery, and Tewkesbury. Those of Canterbury were destroyed in 1704; and the carved panels of the stalls at Winchester survived until the civil wars.

The introduction of tabernacles and canopied backs was of later use than the stalls or forms. Bishop Lacy, at Exeter, in the fifteenth century, gave hangings, to be placed behind the canons and vicars, of damask for summer use, and of green powdered with flowers, in winter time to preserve them from wind and cold, and sixty years later cloths were hung in the choir for a similar purpose. The solid wall at Rochester and Llandaff, and the stone screen at Canterbury, c. 1304, enabled the monks to dispense with canopies; but the cold was so keenly felt at Peterborough and Ely, 1254, that caps were worn during the inclement season of the year—Michaelmas to Easter—in choir. Polydore Vergil, in the sixteenth century, gave hangings embroidered with his arms for the stalls at Wells (Leland, ii. 124): those given by Prior Goldstone to Canterbury are now at Aix. The screen hangings used for shelter and ornament at Exeter represented the story of the Duke of Burgundy, and were blazoned with chequey arms, the gift of the Courtenays. At Peterborough, in the transepts, tapestry, with the Deliverance of St. Peter out of Prison, of the time of Henry VIII., is the solitary relic of sixteen pieces used on festivals and suspended from the choir triforium. At Manchester, tapestry of a much later date, c. 1661, and at Chester, served till lately as a dorsal. At Lichfield, four times a year,—from Christmas to Purification, from Easter Eve to the octave of Trinity Sunday, from the Assumption to Michaelmas, and on St. Chad's day,—the church was adorned with silken hangings and cloth. At York, Archbishop Lamplugh gave tapestries for hanging the reredos. At Westminster, tapestries were hung round the easternmost bays at the coronation of Charles I. Until 1765, the bays between the pillars were hung with tapestry at Carlisle: at Peterborough, the tapestry hangings remained till 1643; at Norwich, till 1740; at Westminster, in Dart's time.

At Exeter, the vicars—then as numerous as their masters, the canons—were in the upper stalls at the east end, with only the archdeacons and the chancellor and treasurer beyond them. The annuallars, chaplains, and clerks were of the second form. At Lichfield, by a bad arrangement after the restoration, the stalls of the canons were interrupted by the vicars' and other stalls in the centre of the range. In cathedrals of canons regular, the bishop was vice-abbot, in place of abbot, with a prior as president: in monastic churches, the abbot, under the bishop, had jurisdiction in matters concerning the rule (Frances, xxxi. n. 59, 60).

There were three ranges of seats, called at Chichester "books," but ordinarily forms. At Hereford, in the third form sat canons and priests; in the second, deacon and sub-deacon vicars; in the first, clerks in inferior orders; but at Chichester, the choristers were called boys of the third form, the order being inverted. The double choir dates from the Arian heresy (Frances, p. 87). The clerks sat in front of their masters at Beverley. At each corner of the oblong formed by the stalls, in the nine cathedrals of the old foundation sat a dignitary; on the S.W.—as the highest place of dignity (Scarfantoni on Ceccoperius, lib. i., tit. ix., n. 16)—the dean; on the N.W. the præcentor: hence the terms used to designate the respective sides of a choir, *Cantoris et Decani* (Stat. Linc., 1215); the chancellor on the S.E., and the treasurer on the N.E., thus exercising a complete supervision. At Chichester these stalls were specially canopied. At Salisbury an archdeacon sat next to each of the dignitaries, the sub-dean in the third stall, on the dean's side: in the middle were canons; then priest, vicars, and first deacons, according to age, who were tolerated in the upper grade, by dispensation. The succentor was in the third stall, on the præcentor's side. In the second form were minor canons, then deacons and the other clerks: in the first form were "parvi canonici," and the other "parvi," according to age. Canons first occupied the upper seats in the choir, in the time of Pope Urban II., 1088-99, the inferior ministers using benches or forms (Thomassin., P. 1, l. iii. c. 10.). Every canon was to keep his own seat, and never to occupy the stall of an absent dignitary (Scarf., i. 34, 80; iii. 142). Where all the seats are alike, and the dignitaries (as archdeacons of churches of the new foundation) had no appropriated stall, then the canons might occupy the vacant stalls of their brethren, in order to preserve the choir from an uncomely and bold appearance, and from the intrusion of other persons to interrupt their order (Ib., i. 84). The first stalls on the right and left were always reserved to the first and second dignitaries (Ib., 35). The chaplains or vicars were not to sit in the same line or order with canons, and the place of their chief "Magister Chori," who was chosen by the chapter, was at the head of the second range (Ib. iii., 138). There was an *ordo Personarum* and an *ordo Sacerdotum*, both having stalls at Meaux in 1227 (Ducange, v. 214). Where the seats were returned the superior occupied the most westernly stall. At Ely and Carlisle, exceptionally, the bishop, as vice-abbot, occupied the customary seat of the dean, who sat in the prior's, or N.W. stall. A throne like a large choir-stall was allotted at the extremity of the range, usually on the south, to the bishop, for preaching, or during the daily office (Martene, de Ant. Ecc. Rit., i. p. 132) as in the centre, the place of dignity (Frances, p. 88), and a seat near the altar on the north side, during pontifical high mass (Ibid., 79). In the basilica, however, the bishop's choir-seat was in the ambo (Soc. H. E., lib. vi. c. 5), and used by him when preaching (Mayer, i. 38). His faldstool was in the midst of the apse, and called his throne, because in his diocese he acted as chief ruler, with the priests sitting on either hand and the deacons standing (Ibid., lib. xv. p. 50). The thrones of Durham, Exeter, Wells, and Hereford, of the fourteenth and fifteenth centuries, show the increase of episcopal splendour. With a specially solemn meaning at Durham, Bishop Hatfield raised his throne over a tomb also: (as Mr. Eustace playfully says) he sat higher than the Pope's chair. At St. David's the throne, c. 1500, contains a central stall, with side seats for the collateral canons, with a low partition (c. 1342) round it. The throne of Bristol is c. 1543. At Durham, the bishop frequently occupied an ordinary stall.

The correct position of the archdeacon was facing the bishop, as his "eye." Certain precedence was given to the sub-dean at Salisbury, Wells, Exeter, and York, and in the latter cathedral to the sub-chanter of the canons. The ordinary arrangement was, that the canons regular, and monks, sat in order of dignity or profession—seniors before juniors, priests before deacons, and deacons before sub-deacons; but in secular churches the stalls were marked, being divided into those of priests, deacons, and sub-deacons. The name of his prebend and the antiphon of the psalm which each canon was bound to recite daily for benefactors and departed canons were written up over his stall, as at St. Paul's, Lincoln, Chichester, Wells, &c., to which was added afterwards a notice of his preaching turn at Hereford. Citations to residence were affixed by the prebendary's vicar upon his stall. At Lichfield every canon was provided with his own light and book in choir; and a vestige of the old custom was preserved a century since at York, where, on the eves of certain holy days, a branch of seven lights was placed before each of the dignitaries' stalls. On feasts of nine lections at Lichfield, the chapter and collect were read out of the last stall on the east. At Canterbury, Westminster, and Wells, the lessons are now read from the stalls.

At Exeter we find books for devotional use chained before the altar; antiphoners chained before the dean, chancellor, and treasurer; ordinals in front of the precentor and succentor; and books chained between the choir-step and altar-step. Such chained books still remain at Selby.

The treasurer provided the lights for the choir. At Canterbury, York, Winchester, and Salisbury, a large seven-branched candlestick stood in the centre of the choir. A small candlestick of this kind is in use in the Lady Chapel at Lichfield. At Exeter, on Great Doubles, twenty-six lights burned in choir, and one on the choir-step: the pyx was pendent, and silver coronæ were hung lengthwise between the altar and screen. At Chichester two tapers during the night offices were lighted in the central chandelier, two on the altar step, and one outside the choir near the step leading to the vestry. At Hereford, Chichester, Exeter, and Lichfield, the central chandelier held twenty-four large tapers. The exact number of tapers to be lighted was rigidly defined. The priests, vicars, and vicars choral were required to learn, in their first year of probation, the hymnal and the antiphonar by heart, and in the second year the psalter, so that they would not require lights. At Ripon late in the last century the church was a blaze of light on Candlemas day, at evening service. At Durham there was a bell behind the stalls for signalling to the sacrists the time for ringing or stopping the church-bells. One of the most extraordinary occupants of a stall is mentioned by Bartholomew Cotton, under the year 1290, whom a canon of Hereford found after matins—an unearthly imp vested in robes, but deaf and dumb; however, the canon motioned him under awful penalties to remain until his return, when, with the whole collective chapter, he fell upon the wretched creature "like Germans," put him in fetters, and left him heavily chained before the Cantelupe Shrine. At Lincoln the churchwardens were greatly annoyed by the spirits of Bloet and others walking about the church at night.

Mats (Comp. Reg. of Durh., p. 174) were provided for the upper grade and second form at Exeter annually; at York twice a year. They were also provided in the chapter-house and before the altars. Hay or straw was laid down in the choir, sacristies, and loft, for warmth. At York and Hereford, on great days, it was sprinkled with ivy-leaves. Rushes were also used at Salisbury and York, and at Bristol, even Exeter, silver pendent coronæ were also employed now, when the mayor attends in state. The cold, however, was still felt; for, in 1390, the vicars

* By the Rev. Mackenzie E. C. Walcott, M.A. See p. 329, *ante*.

choral were delated at York for wearing clogs and patterns in choir. At Chichester the church was swept out with brooms twice a year.

At Lichfield the choir, till a recent date, was paved with cannel coal and alabaster. The use of marble pavements in the choir commenced in the seventeenth century; at Canterbury it was laid down in 1704. In the choir of St. David's there is a fine pavement of encaustic tiles; at Gloucester one in the sanctuary of armorial character, c. 1450. Good specimens also remain at Malvern and Worcester. At Canterbury and Westminster very beautiful mosaic pavements have been preserved. Out of the fragments of the French porphyry, which Edward I., in his eighth year, brought from France for his father's tomb, he made pavements of tesselated work (Leland's Coll., iii. 404). At Lincoln, a slab remains in the floor, marked "*Cantate hic;*" and Pugin discovered the marks of the chairs occupied by the rectors of choir. On the great festivals the præcentor "ruled the choir," standing at the altar-step, with the rectors of choir on either side, who carried staves in their hands, with which, marking the time of the chant, they walked to and fro up and down. At Lichfield, and probably in other cathedrals destitute of cloisters, the ceremony of the Maunday took place in the choir. At York there are some stalls and aumbries in the north side of the choir, which were probably connected with the ceremonial. Ancient statutes exhibit some curious customs and grave irregularities in choir; those of Exeter forbid banquetings and drinkings; and complain of talking and levity and irreverence. Bishop Grandison peremptorily forbade the acting of plays at Christmas, in 1360. At Lichfield, on Christmas Eve, was performed the representation of "The Shepherds;" at the dawn of Easter, "The Resurrection;" and on Easter Monday, "The Pilgrims to Emmaus." At York "The Three Kings" were represented at Epiphany, and "The Shepherds" at Christmas, stars being employed in the scene. At Wells no plays or spectacles, or exhibition of monstrous masks by laymen, at Whitsuntide, were to be suffered; nor gesticulations at Christmas time by the vicars during the divine service in the sight of the people, under pain of excommunication. In the earlier statutes a distribution of wine was made after mortuary masses to the canons and vicars present in choir, but a money payment was afterwards made in commutation.

At Durham the brass eagle for the lectionary stood in the choir, and another, of wood, near the choir-door. One was erected at Peterborough in 1472. There is an ancient specimen at Southwell, which formerly belonged to Newstead; at Winchester; York, 1686; Canterbury, 1663, used as a Litany desk; Lincoln, 1667; Bristol, 1683 (now in St. Mary-le-Port); and at Salisbury, 1714. Besides the eagle there was the lectern, or lectricium, for the rectors of the choir at Hereford, probably resembling the stone desks of Wenlock and Evesham, c. 1218 (Archæol. xvii. 278), and that of Gloucester. It stood in the midst of the choir, and was used for the reading of the Gradual and Alleluia, and for the lections on certain high days. The sub-deacon read the Epistle from the lectern at the step of the choir at Hereford, the Gospel being read from the upper step on the north by the deacon; but at Salisbury the Epistle was read from the rood-loft, or pulpit, on Sundays, and when the choir was ruled, but at other times on the choir-step. At St. David's the book-desk used by the bishop rests on the stand of a lectern of the sixteenth century. A Late Decorated lectern in the shape of a pelican remains at Norwich. A simple brass desk is at Wells, c. 1660.

In re-arranging the choir of a cathedral of the new foundation on the principle adopted for seating dignitaries in the old foundations, we can place the dean and sub-dean in the two western, and the archdeacons not canons in the two eastern stalls; the canons residentiary near the western ends; and the hon. canons (answering to non-resident canons) eastward; with the minor canons and their precentor (answering to the vicars and succentor) still more eastward, next the archdeacons, if there is room, or in the second range; and then, perhaps, the vicar in course, as the deputy of the hebdomadary canon, should be allowed a fixed stall in the upper form. In all cases where rood-screens are modern, we shall do well to remove them, and allot the nave exclusively to the laity, with an open screen to the choir entrance. Where the screen is, and the stalls are not ancient, we may form the western part of the choir into a quasi-nave, with the seats of the laity facing eastward; and rearrange the stalls towards the presbytery in sufficient numbers to contain every member of the capitular body, and the entire staff of vicars and clerks, dividing the clergy from the congregation by a low chancel-screen. By also placing open screens in the eastern bays, and by using again the triforia as was intended, large additional numbers may be accommodated both in the choir aisles and those upper galleries.

According to "Eulogium Historiarum" (i. 204), Pope Boniface II., c. 533, first made a distinction between the clergy and laity at mass. By the council of Nantes (658, c. iii.), lay persons were forbidden the choir (Martene, Thes. Anecdot., 962, 1108-9, 1202, 1247; Archæol., xi. 388-9; Frances, c. V. n. 42, 44; Counc. of Tours, 566, c. 4), and Martene complains that the laity, interdicted from approach except for communion (Frances, p. 78), pressed into the choir, and women sat on the altar-steps (de Ant. Rit. Eccles., i. 124); and this, probably, occasioned the introduction of the side screens of the presbytery, as at Winchester, 1528; at Carlisle, 1484; and another of Cinquecento work, c. 1540. They also gave access to the aisles by means of doors, and permitted the passage of processions without interruption to the choir service.

The Rood Beam.—A screen of lighter construction than that which fenced the entrance of the choir parted off the sanctuary at the extremity of the stalls, like a chancel rail. A solitary instance remains at St. David's, and, till recently, at St. Alban's. The end of the moulded beam of the thirteenth century remained embedded in one of the pillars: formerly, an altar of the holy cross, enclosed within an iron screen, stood beneath it. At Malmesbury a similar screen is said to have existed (Eccles., x. 152).

The Presbytery or Sanctuary (Frances, c. v., n. 37-41; c. xiii. 121; Jewell's Controv., i. 198, 310, 311; Conc. Rom. s. P. Eug., ii. c. 33; Bracar., i. c. 31; Vasense, c. 3; iv. Carth. c. 93; Bingham, viii. ch. vi. § 1; Scarf., i. 84), occupied the space between the choir and altar; it was also known as the *caputium, secretarium,* and *sancta sanctorum.* An ascent (*gradus presbyterii*) from the choir led to the presbytery, and a second flight of stairs (*gradus altaris*) led from the *planum presbyterii* to the altar. The presbytery usually stands on a higher level than the choir, being raised upon the crypt, the choir in turn being raised above the level of the nave (at Worcester and in other places the latter distinction has been obliterated in modern times); but at Canterbury, Winchester, Rochester, &c., grand flights of stairs still lead up to the choir. At Canterbury, Winchester, Worcester, and York, noble flights of stairs form the ascent to the presbytery; but at Norwich a Basilican arrangement was preserved probably until the stall work was erected, in the five arches of the apse. The steps to the central throne of the bishop remain in the east wall; and the doorway is still visible in the aisle. At that period, when the altar stood in the chord of the apse, a low screen and bench table for the clergy extended on either side, and the aperture in the vault through which the sacrament light was let down marks the position of the high altar. At Ely, Salisbury, and Gloucester a more richly carved boss denotes its site. In the thirteenth century the square east end became common in England, and the apse was replaced by a single east window; and it must be left to the taste of individuals which of the two forms is preferable, the grand apses of Peterborough, Norwich, Pershore, Tewkesbury, Westminster, or the noble windows of Lincoln, Dorchester, Carlisle, York, and Gloucester, and the tiers of lancets at Ely. At Canterbury, on the top of the flight of steps behind the altar, stood the patriarchial chair. The primate's marble throne of the thirteenth century is still preserved, and at Peterborough the abbot's stone chair remained, until the civil wars, adjoining the altar. Above the high altar, which at Canterbury, York, and Worcester was flanked by lateral altars, stood a beam at Canterbury, Westminster, Chichester, St. Alban's, Hereford, and Salisbury, upon which were arranged a rood, the relic chests, angels, and many tapers. At Chichester it was painted, supporting a crucifix and eight lights, and at Canterbury, where it carried seven gilded relic chests (somewhat like those at Winchester, of Cinque-cento date, set up by Fox as the side screens), a majesty, and images of SS. Dunstan and Elphege, supported on two pillars covered with rich metals, and flanking a cross set with sixty crystals. Adjoining it was a gilt, star-like glory, supported by archangels with expanded wings. The high altar erected in 1397, and screened with curtains, was backed by a reredos with two doors leading to the feretory, and immediately behind it was a small sacristy containing reliquaries. At Chichester, Llandaff, Canterbury, and York, there was a sacristy behind the high altar for the reliquaries and the use of the bishop at his enthronisation or pontifical mass. At York and Chichester there was a minstrel's gallery above it. At York were altars of St. Stephen on the north, and St. Mary on the south, and the paschal taper was adorned with colours, flowers, ribbands, and a dove, and, as at Exeter, with pendants and pennons. At Canterbury, on the north, was the altar with the shrine of St. Elphege, and on the south that of St. Dunstan. At Worcester, on the north side, was St. Oswald's; on the south, St. Wolstan's shrine, each with its bracket and western altar.

Matthew Paris has fortunately preserved to us a description of the appearance of a Norman high altar at St. Alban's. It had a superb frontal of carved work, inlaid with metal; over it appeared St. Alban's shrine, with relic shrines around, and in the centre the pendant pyx, suspended from the painted vault of the apse. At St. David's, the mortise for the Gospel lectern remains in the altar step; at Canterbury, a small orifice probably served for the same purpose; and at Exeter, the eagle till recently stood below the altar-step. At Manchester, the credence-table of wood, and at Lincoln the Easter sepulchre, with its sleeping guards; at Norwich, the quatrefoiled aperture for the watchers remain. The sedilia, or graduated seats for the priest, deacon, and subdeacon, remain at Exeter, Rochester, Selby, Ripon, St. David's, Ottery, Binham, Worcester, and Dorchester, and Tewkesbury, the latter still retaining their colour; four in number at Westminster, Durham, Furness, Paisley, Gloucester, Bolton, and Ottery, in the lady chapel, and five at Southwell. The chaplain, deacon, and subdeacon, or cross-bearer, and, on great days, a canon with the mitre, were thus accommodated at an episcopal mass; and on great festivals, when the dean was celebrant, the assistants were doubled; but at Durham there are four sedilia on either side of the altar, these were probably used by the four acolyths in the pontifical mass, one with the mitre, the thuribler, and taper-bearers (Martene, de Ant. Rit. Eccles., i. 221). The præcentor and rectors of the choir had iron folding chairs when ruling the choir. Trivet says, that Edward I. gave the royal chair in Scotland, in 1296, for the seat of the celebrant at Westminster (Leland, Collect., iii. 328). Stowe, Harding, Holingshed, and Fabian mention it thus occupied. Those of Hexham, Beverley, and Westminster were of oak. The frid-stool, or chair of sanctuary, a hollowed seat of stone, is still preserved at Hexham and at Beverley. The privilege was held by many churches, as at Beaulieu, St. Martin's le Grand, Westminster (Archæol., viii. 1), Ramsey, Croyland, Ripon, St. Burian's, Tintern, Jarrow, Lecominster, and Whitefriars (Jo. Assoc. Soc., vol. v., pt. ii., p. 253).

Reredos.—Curtains or dorsals originally fenced in the east side of the altar, but in time were replaced by the reredos of stone, as at Exeter, Lincoln, Brecon, Beverley, Bristol, York, Canterbury, Durham, Westminster, and with exquisite specimens, now lost, at Peterborough, Tewkesbury, and Gloucester. But these are dwarfed in importance by the enormous screens which were designed to enhance the magnificence of the high altar at St. Alban's, 1326—35; at Christchurch, Winchester, and St. Mary's Overye, a gorgeous structure, covered with tabernacle work, images, and sculpture, although obstructing the view of the furthest eastern limits of the church, which had heretofore augmented the sublimity of the sanctuary. And yet it appears like the gorgeous veil of a further holy of holies, wherein is the substance of which our earthly services are but the faint shadows. The germ of it may be seen in the panelled east wall at Wells. We cannot portray to our imagination the grandeur of Winchester when its canopied niches were filled with silver figures of saints surrounding the superb jewelled rood, above which hung the crown of Canute; but we may question if it could equal in effect the eastern end of Durham, where more than a hundred statues filled the empty canopies of its exquisite screens, c. 1380, and its pinnacles glittered in the light of countless tapers. Curtains of the richest velvet and silk closed the sides of the altar, on which lay the superb *Liber Vitæ*, the record of departed bene-

factors. Over it sparkled the golden pyx; below, a canopy, crested with a silver pelican. On the north side stood the pelican of brass for the gospel, near the place of the eastern sepulchre; while three lamps, suspended by chains and burning in basins of silver, threw down a tempered light perpetually. From Maunday Thursday until the Wednesday after the Feast of Ascension, a superb paschal candlestick, with seven branches (a type of the pillar of fire that led the Exodus), wrought into flowers of glistening latten, supported the Easter candle, which reached almost to the vault, and was lighted on the morning of the resurrection when the solemn procession, singing the hymn *Christus Resurgens*, with torch and taper, compassed the whole church. At St. Paul's and Durham a buck was offered at the high altar annually, and a lamb by the tenants at York.*

IRON, AND HOW IT IS AFFECTED.†

When we remember that the very best wrought-iron of commerce is, to use the words of the well-known metallurgist Saint-Claire Deville, but a metallic sponge, like platinum, the pores of which have been simply closed up by pressure or percussion; that, in one word, ordinary wrought-iron has never, as wrought-iron, been fused, it will be seen that the uncertainties qualifying the material itself are still greater. Mr. Mallet thus found that, while the original hammered slab of a very large forged mass had a breaking strength of 24 tons to the square inch, it fell progressively to 17 and 16 tons at the different places of the mass, down to even as low as 6¼ tons in some parts. Unless this iron had been burnt, its tenacity could doubtlessly have been restored; and, if drawn into wire, its breaking weight might have been increased to perhaps 90 tons to the square inch,—at least before annealing. An average of 188 experiments, made by Mr. Kirkaldy on rolled bars, gave a maximum breaking strength of 30¾ tons, and a minimum of nearly 20 tons to the square inch. These influences of the manufacture merely on the quality of wrought-iron are almost independent of the chemical constitution of any individual bar. For instance, until it be proved to the contrary, there are many reasons for the general belief that the cold shortness of wrought-iron is due to the presence of silicon and carbon, and its hot shortness to that of sulphur. A fractional percentage of copper also makes wrought-iron hot-short. In truth, there are probably no two bars or parts of a bar of an exactly similar chemical composition, or in an exactly similar state of molecular aggregation, and, therefore, of an exactly similar breaking strength or elastic limit. Even these are only a few of the elements of uncertainty in structural materials. But, when we further take into account the varied strains of extension, compression, distortion, twisting, and bending, to which mechanical structures are more or less subject; that the work done by a gradually applied load is doubled if this load be applied suddenly; that the impulsive strain of a moving load is generally more or less intensified by vibration; and that the varied shapes and arrangements intended to receive these strains must be often as much fixed by financial as scientific considerations, then the reason that the best engineering practice makes the ultimate strength of a wrought-iron structure from four to six times the working load must be even popularly evident. But these factors of safety are not sufficient. The structure must be tested as searchingly, and as far as is consistent with safety,—as far as is possible without injuring the material and its relation to the structure. In our case this limit is, in the main, given by the limit of elasticity of wrought-iron under extension, as this limit is less for wrought-iron than that of compression. It is also self-evident that the mode of testing adopted ought to approximate as nearly as practicable with the kind of stress the object is intended to undergo in practice. After loading a railway bridge with the greatest passive, or perhaps impulsive load that would ever come upon it in practice, the deflection and the permanent set, if any, are both carefully noted. As a boiler is subjected in practice to a complex train of mechanical and chemical forces that are always striving to break their bonds, its ultimate strength is made from six to eight times the working stress, and it ought to be periodically tested to half its working pressure. Its extension under this pressure is sometimes — and should always be—measured by the volume of water that is pumped in by pressure after the boiler has been filled; while the permanent set is determined by the difference between the volume pressed out by the contraction of the boiler when the pressure is withdrawn, and the volume of the water that remains in the boiler after the test—allowance being of course made for any slight leakages and sweating at the joints. In first-class locomotive works the deflexion and permanent set of the steel springs are always tested in an apparatus for the purpose. It may here be remarked that, although the designs of all the successful wrought-iron structures ever built have been based on the assumption of a limit of elasticity, nevertheless the relation of the permanent set of wrought iron to its ultimate resistance under a given load, is still a subject of some discussion. We have, on the one hand, the testimony of Professor Eaton Hodgkinson, who says, that "the maxim of loading bodies within the elastic limit has no foundation in nature;" and, on the other hand, some appear to believe that iron is even improved by breaking it under at least a tensile stress. Mr. Hodgkinson found that a rod, 10 feet long, and of 1 square inch section, took a permanent set of 0·0005 of an inch under a static load of 1¾ ton. Mr. Edwin Clark obtained very similar results. Such a microscopic set, however, could be referred to the elongation caused by the heat generated by the internal friction of the particles, or to the probable fact that these bars were also new; and it is conceivable that they might have taken a slight permanent set, just as new ropes take a permanent set, without injury, when the strain is first applied. There are, indeed, very few forms of wrought iron in which its internal particles are not, *ab initio*, subject to some mutual strain. At any rate, these elongations were very slight, and increased uniformly up to tensions varying from about 10 to 15 or 16 tons on the square inch. Beyond these strains the bars elongated in an irregular manner, until they at last broke. At the same time, as Dr. Rankine remarks, the demonstration by Mr. E. Hodgkinson that a set is produced by a strain much less than what would injure the specimen, renders the determination of the proof-strength a matter of some obscurity; but Dr. Rankine points out that the best test now known is the not producing an increasing set by the repeated application of a load. Some years ago, Mr. Loyd, of Woolwich, made certain experiments which have been cited as proving that a breaking strain does not injure iron, even when this strain is four times repeated; or rather, that after breaking a bar into, say, two pieces, the two pieces are thereby made stronger. In, for instance, experiment 2, the 1½ bar marked C was found to break with 33¾ tons, with a stretch of 9¼ inches in 54 inches; a piece of this bar then broke at 35¼ tons, with a stretch of only a quarter of an inch in 36 inches; another piece of the bar, 24 inches long, was broken at 37 tons, with a stretch of one inch; and at the fourth and last breakage was found to give way at 38¾ tons, but without any stretch at all. . . .

There is probably no metal the strength of which is influenced in such a remarkable way by temperature as iron. As M. Baudrimont showed in 1850, the tenacity of iron is less at 100° C. than at 0° C., but at 200° it is greater than at 0°, and these results have been exactly confirmed by Dr. Fairbairn in some experiments on boiler plates, communicated in a paper to the British Association. At yet higher temperatures this tenacity is of course diminished; and Seguin has shown that iron, the tensile strength of which could be represented by 100 at 10° C., had this tenacity lowered to 90·5 at 370° C., and to 58·7 at 500° C. In the royal dockyards of Woolwich and Portsmouth the atmospheric temperature during the testing of each anchor or chain is carefully noted, although the proving houses themselves are kept at a mean temperature of 56° Fahr., by means of stoves, which also thus save the water-pipes from freezing. This temperature of course falls a little during the winter and rises in summer, as the heat in the shade generally varies in England from about 76° to perhaps 34° Fahr. The action of frost on iron has not been completely investigated; and Dr. Percy recommends that some accurate experiments on the question be undertaken by the Institution of Civil Engineers. The daily observation of practical men has, however, as in so many other cases, preceded the deeper investigations of science. All workmen know that their tools, such as picks and chipping hammers, which have to undergo percussion in frosty weather, are then more liable to get broken. All chains are well known to be more subject to snap under the same circumstances. There is always a notorious increase of accidents through breakages, both in the permanent way and rolling stock of railways during frosty weather. It is stated that during the severe winter of 1860-61, 498 rails were broken on the Chemin de Fer de l'Est, from the 11th December to the 31st January inclusive. No less than 258 were broken from the 21st to the 25th of January, during which period the thermometer descended to—7·8°, and even to—16° centigrade. General Morin relates that during the northern campaigns of the first empire the artillery veterans used to believe that wrought-iron was subject to freezing, and after long winter bivouacs they never began their day's march without striking the gun-carriage axles in the direction of their length, and the vibration thus produced was said to "thaw" the iron. An intense cold is also said to have enabled the French garrison of Hamburg to disable the cast-iron siege guns, by knocking off the trunnions before evacuating the place. Mr. Lenox stated, in evidence, before the 1860 Committee, his belief that a cable would stand a test in warm weather that it might not in cold. The crews of the fishing vessels on the coast of Nova Scotia find that the cold renders their cables so brittle that a length of hempen cable is used for the portion out of the water, while the anchor end is kept from the vicissitudes of the atmosphere by the usual average temperature of the sea. A few experiments made by Mr. Kirkaldy showed that the breaking strength of a bar is slightly reduced by freezing when a gradual breaking load was applied, but that this difference between a frozen and an unfrozen bolt is much more increased by a suddenly applied load, being 3 per cent. less when frozen. The usual way adopted by French engineers to test rails is, as we have seen, to prove a percentage of the lot by means of a falling weight. Some tests were carried out a few years ago by M. Couche, on a number of rails, of very good quality from the Anzin works. The monkey weighed 300 kilogrammes, and the distance between the supports was 1m. 10. When the thermometer varied from −4° C. down to −6° C., the weight had only to be raised, in an average of twelve experiments, to a height of 5 feet 6 inches, in order to break the rail; but when the thermometer rose from +3° to +8° C., then the weight had to be lifted for a fall of 7 feet 9 inches. Similar experiments, conducted in 1860, showed that a difference of temperature from − 4° to + 5° Centigrade, was sufficient to greatly influence the height of fall necessary to break the rail. It is not unnatural to suppose that the particles of iron, after being worked at a heat and allowed to cool and set at a medium temperature, should when that temperature is lowered, get into a state of mutual strain; or that any initial mutual strain should be thus intensified. The toys made of suddenly cooled glass, known as Prince Rupert's drops, are exaggerated instances of a similar action. The outside portions of a bar, of whatever size, would evidently cool, and consequently contract, first of all. The inside portions would also at last cool; but, having kept the outside portions distended, when the inside does cool, it then becomes a question, to be determined by various circumstances, whether it would pull the outside shell into a state of compression, or whether the outside shell will draw the inside into fissures by tension. A somewhat similar explanation is given by Mr. Mallet of the rents caused in the interior of very massive forgings; and this state is probably always induced by the conditions of cooling in a small bar, but with, of course, a smaller range both as to size and temperature. In any case, it is apparent that a ductile, elastic material ought to be less affected by these doubtlessly complicated conditions of tensile and compressive strains. It is, therefore, probable that a hard, harsh, iron would be more affected by frost than a soft ductile iron; and also that the breaking strength of both qualities would be less affected by cold than their extensibility.

* To be continued.

† From the paper by Mr. F. A. Paget, C.E., referred to in our last.

THE GUTTER IN MODERN FRENCH ARCHITECTURE.

The most distinctive feature of the cornice of a modern house in Paris, and sometimes of the entire front, to an English eye, is

THE MONUMENT OF BISHOP ANCHERUS, STA. MARIA MAGGIORE, ROME.

the *chêneau*. The word may be taken to mean gutter; and it would be used for that member of the antique cornice which was generally, as in Roman work, a cymatium ornamented, and furnished with lions' heads to spout the water from the hollow eaves'-gutter. But the *chêneau* of the French architects is different. Instead of being dished out of the top member of the cornice, the *chêneau* is rather to be regarded now, and perhaps more in accordance with the etymology, as a trough-gutter, placed *upon* the decorative member before mentioned. In position, it may be compared with a blocking-course, or with the parapet to the gutter of an ordinary London house which has a merely decorative cornice, excepting that the *chêneau* will in many cases be in advance of the face of the wall. With us, the blocking-course is seldom decorated; but the French seize upon this very feature, and give it the utmost enrichment, whilst the cornice below will be left plain. Adopting their system, it follows that the cornice has very slight projection. Such is the arrangement (only, some would say, carried to excess,) of the cornice in the new portion of the École des Beaux Arts, where the *chêneau* is most remarkable for its height, and for its richness of ornamentation. The examples given in Mons. Daly's work on the "Architecture of Paris" (our review of which is not yet finished), somehow, do not happen to include many of the enriched forms of the *chêneau;* but the thing itself will be understood from nearly every one of the examples. There is one of them however, the villa in the Avenue de l'Impératrice, by Mons. Hermant (Fig. 1), which shows the combination of a scolloped line with rosettes and *antefixæ*, which is very common, but does not altogether satisfy us. The author of one of the designs for the South Kensingtom Museums, has introduced the *chêneau*, as mentioned in our notice, and treated it very successfully in combination with *antefixæ*. Another form is well exemplified in the Hôtel des Ventes Mobilières, as given in Mons. Daly's "*Revue de l'Architecture et des Travaux Publics*," and which we reproduce (Fig. 2). Here the *chêneau* is a moulded blocking-course, with *antefixæ* at certain distances on the face; and between them are two small rosettes, or five-leaved flowers.

In other examples, *antefixæ* may stand upon the *chêneau* over each pier or pilaster, as in Fig. 3, from a house on the Boulevart Monceaux. Some of these features deserve to be looked at by those architects who adopt Sir Charles Barry's vase-formed terminations, which were not very successful.

In many cases the *chêneau* may appear as no more than a zinc or lead-covered trough.

In the more richly-decorated *hôtels*, a *chêneau*, or gutter, will be found at the meeting of the two slopes of the Mansard roof, generally upon an ornamented roll-moulding (Fig. 3). In this case, of course, lead or zinc will be employed.

The French are first-rate artists in this kind of metal-work, as in every other; and the manner in which the kind of work contributes to the effect of the roofs of the Louvre can hardly be forgotten. In the *hôtels* of the first-class, the dormers are richly carved in stone; but elsewhere, zinc is much employed for these features, and for oval-formed lucarnes. To the principal entrance of an *hôtel*, there is generally a *perron*, or glass-covered shelter to the steps and threshold. The metal-work of this is very elaborate. The feature generally cuts across the masonic architecture, with no effort made at combination.

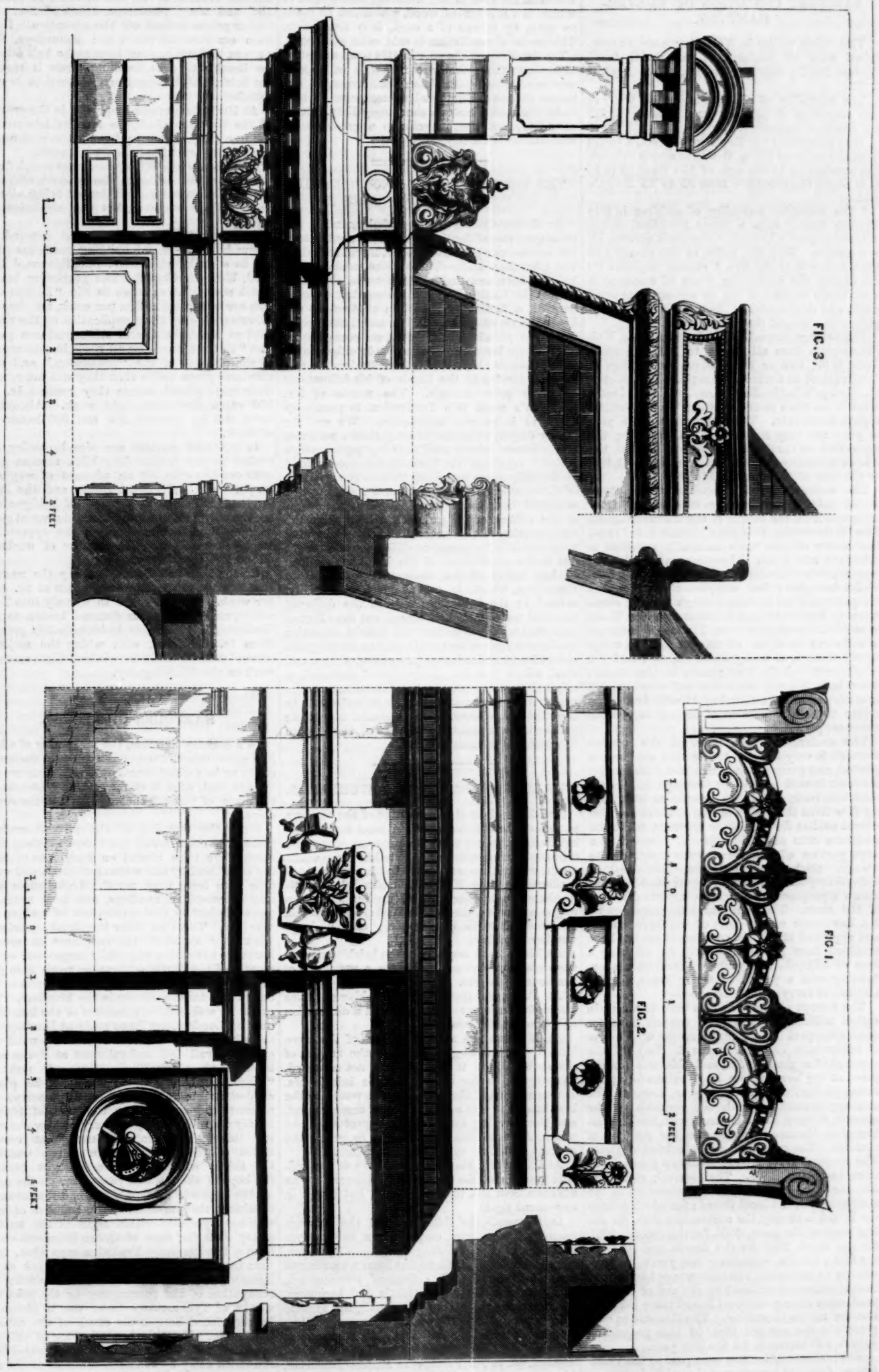
THE MONUMENT OF BISHOP ANCHERUS, ROME.

This remarkable monument stands in a side chapel of the south aisle of the ancient church of St. Prassede, near to Sta. Maria Maggiore, in Rome. It represents Bishop Ancherus, a native of Greece, and titular cardinal of the church. The date of his death is given in the concluding verses of a long inscription in Byzantine characters on the slab above the monument, as follows:—

Anno milleno centum bis et octnageno
Sexto decessit hic prima luce Novembris.

The tomb and effigy are executed in marble. The latter is vested in a flowing chasuble, with low jewelled mitre, and embroidered gloves and sandals. The monument has panels of mosaic, and a fictitious arcading, the upper portion of which is hidden, as it were, by an ample pall sculptured in fine folds and diapered with roses and *fleurs-de-lys*. The drawing we have engraved was made from a sketch on the spot by Mr. George Goldie.

THE GUTTER IN MODERN FRENCH ARCHITECTURE



SANITARY CONDITION OF WOLVERHAMPTON.

THE value of life in Wolverhampton, as compared with all England, is, for males, 2·845 against 2·305; and for females, 2·673 against 2·132.

The mortality of children under five years of age stands as 20·959 per cent. against 13·517 for England altogether.

It appears from the Registrar-General's tables that the value of life in Wolverhampton is below the average up to the age of 15: from 15 to 35 it is above the average: from 35 to 85 it again sinks.

"The excessive mortality of children in this English town," says a paper published in the *Wolverhampton Chronicle*, "demands serious investigation. Why the value of life should rise from fifteen to thirty-five, I cannot explain: its fall during the advancing years of manhood is more easily accounted for, as arising from overwork, and destruction of the organism from irregular life amongst the lower classes."

The average annual rate of mortality in Wolverhampton from all causes to 10,000 persons living is 28, two or three above the average of Staffordshire as a whole. Excepting Manchester, St. George's-in-the-East (London), and Leeds, there is no town in the kingdom that presents a higher death-rate. The fluctuations from year to year are very remarkable. Calculating the population as numbering at present 63,000, the rate of mortality in 1863 stood as 28⅔ per 1,000, by the side of 24·8 per 1,000 in 1862.

The water-supply is described in the paper quoted as being derived from two sources, from wells and from the supply of the Wolverhampton New Waterworks Company, founded in 1855. The water of the town naturally supplied is abundant and good. The company's is derived from a brook at Cosford, in Salop, nine miles from Wolverhampton; but supplementary supplies are pumped from borings through the red sandstone at Tettenhall and Goldthorne Hill. There is no filtration of the water. The supply pressure is sufficient to cover all the houses. In many houses there is no ready water supply; and the inhabitants seek for it at pumps in the street: water is in this way used over and over again to save carriage. The Board of Health has given orders to several owners of houses to provide water-supply.

The drainage of the town at the present moment is very imperfect. Surface drainage is general, and cesspools are abundant. Naturally, the town is well placed for drainage, being on a sandstone rock, and being situate so high that the flow from the drains is easy. There are also several outlets for the escape of water, while the sandstone acts as a filter for the removal of a large portion of the mere watery part of the sewage. Such errors as exist in the drainage of Wolverhampton will shortly be rectified. There is now a proposed plan for the complete drainage of the town. The plan has been inspected by Mr. Rawlinson on the part of the Government, and approved of by him; and sanction has been obtained from Sir George Grey for effecting a loan of 37,000*l*., repayable by instalments, extending over a period of thirty years, for the purpose of carrying out the scheme.

The sewage of the town has been to a certain extent utilized, for the town council have for some time past had an arrangement with a firm of contractors (Messrs. Deans & Son) for the removal of night-soil, &c., and this firm has disposed of the sewage to a large extent for application to agriculture. Last year, however, the sanitary committee, with the sanction of the council, entered into a contract with the Wolverhampton Manure Company for the removal of manure. The conditions are somewhat singular. The contract is for a term of fifteen years, dated from Lady-day, 1864. The removal, cleansing, &c., are to be effected by the contractors to the satisfaction of the local Board; for which service the Board is to pay the contractors 500*l*. for the first year of the term, 400*l*. for the second, 300*l*. for the third, 200*l*. for the fourth, and 100*l*. for the fifth: for the remaining ten years no payment is to be made. The contractors have power to determine the contract at the end of any one year, upon giving the local Board three calendar months' notice in writing. The Committee congratulate the council that by this proceeding 1,050*l*. will be saved for the first year.

But little attention has been paid to the ventilation of private houses or of the public buildings. In the Agricultural Hall, however, there is carried out a simple mode of ventilation, consisting of shafts in the roof of the building, across each of which is a septum of wood, which can be made to open, by means of a cord, into four parts. This mode of ventilation is said to be effective.

The dwellings of the poor in this town are much superior to those that are met with in most of our agricultural districts; but amongst the poorer classes the internal management is said to be bad, and the rooms shockingly dirty. Overcrowding, moreover, prevails to a great extent, with the evils consequent upon it.

THE INSTITUTION OF ENGINEERS IN SCOTLAND.

AT the concluding meeting of the session, the prize gold medal for the best paper contributed last session was presented to Mr. David Kirkaldy. The Chairman said,—These prize medals have hitherto been awarded by the votes of the members of the Institution; and, seeing that we meet here on a footing of equality; that we do not know and do not acknowledge any difference of wealth or social position; that we recognise no distinctions but those of superior intelligence; it is most honourable and most meritorious for any of us to receive at the hands of his fellows one of these prize medals. The merits of Mr. Kirkaldy's work this Institution is peculiarly fitted to judge and appreciate. We see the ability displayed in the investigations: we know the immense labour and untiring perseverance which it requires. Mr. Kirkaldy has not confined his investigations to an inquiry into the strength of different qualities of iron and steel, but has extended them to an examination of the origin of the differences of strength arising from the conformation of the material: he has elaborated most carefully the apparent difference of strength due to the contraction of the breaking section: he has measured the amount of extension or stretching, which, in a sense, is a malleability, caused by the breaking loads in the different material tested: he has traced out the effect of both cold and hot rolling and tensile extension on the strength of material: he has investigated the different and relative properties of iron and steel, which are due to quality of material, to original manufacture, to the treatment of the material by workmanship after manufacture, to the kind of use to which the material is applied; and he has not omitted the effect of the climate in which the material is used.

THE BUILDING TRADES DISTURBANCE.

AT Birmingham the committee of the masters as well as that of the workmen meet frequently, but during the last week no progress was made towards a termination of the strike. The workmen's committee are said to have received applications from Newcastle-under-Lyme, Nottingham, and other places, urging that men might remove to these towns, where they would be provided with employment, and a large number have left.

At Walsall the majority of the bricklayers and carpenters are out on strike for a reduction of the hours of labour.

At Poole, in Dorset, the bricklayers have struck for an increase of wages and a diminution of the hours of labour.

At Malvern the master-builders of the town have held a meeting to consider the subject of the strike, which it appears was not arranged, as reported, so far as regards the bricklayers. It was suggested that a conference would be the best means to accomplish a proper arrangement, and the meeting unanimously approved of the plan. A disposition was shown to grant the alteration of time which the men desire.

At Plymouth the trade has been at a standstill from the strike of masons' labourers for an advance from 16s. to 17s. a week; but is now in movement again.

In Cornwall the following are the average wages paid to men employed in the various branches of the building trades:—Penzance, carpenters, 18s., but there has been a movement for an advance to 20s.; masons' stonecutters, 24s., providing their own chisels and hammers, which require very frequent repair, the granite being very hard to work; plasterers, 24s.; masons' labourers, 15s. Flour at Penzance is 4lbs. for 5½d.; beef, 6d. to 8d. per lb.; veal, 4½d.; mutton, 6d. to 7d. Falmouth: Masons' labourers, 18s.; carpenters, 18s.; ship-carpenters, 23s.; plasterers, 20s. and 21s.; builders' labourers, 15s. to 16s. Truro: Wall masons, 17s. to 18s.; masons' labourers, 13s. 6d. to 15s.; carpenters, 18s. and 20s.; plasterers, 18s. and 20s. The higher prices named are the exception. Hours from six a.m. to six p.m.; Saturdays, from six a.m. to five p.m.; one hour and a half allowed for breakfast. The building trade is regular, not brisk, and the men are believed to be well satisfied.

At Hull, the navvies employed in the erection of the Hull town-hall, the riveters' labourers at the iron shipbuilding yards, and the workmen of some other branches have struck work.

At Grimsby, the bricklayers have struck for an advance of 6d. a day. The masters offered to cede the advance on condition of being allowed to pick their workmen, but this condition was refused.

At West Hartlepool, the great demand for labour in the iron shipbuilding trade has given rise to a strike at Messrs. Pile, Spence, & Co.'s yard, West Hartlepool. The particular branch which now is at variance is the "holders-up," who are in receipt of 23s. per week, and demand 1s. extra; basing their application on the wages paid at Sunderland, and other northern ports. The "riveters" are also off work, in consequence of the absence of the "holders-up," and they also have given notice that they will not resume their employment unless they receive 1s. per 100 extra for seven-eight work. Altogether there will be between 200 and 300 hands out of work.

In Scotland matters are also becoming unsettled in the trade. The Wick masons have gone out on strike for an advance of wages of 3s. per week. The Court House and the large block of buildings at the end of Bridge-street are the only works of importance at present going on, and there are now only a few apprentices employed on them. The number of workmen off work is about forty.

On the Tain and Bonar Railway the navvies struck work, demanding an advance of 2s. each per week. They marched in a body into Tain, where, on making their demand known to Mr. Grainger, the contractor, he immediately granted them 1s. additional, with which the majority seemed satified, while the whole of them resumed work on the following day.

HARBOURS OF REFUGE.

IN a country like this, the prosperity of which in a great measure depends upon our marine, it ought to be a chief consideration to preserve our vessels, and, what is of far greater consequence, the lives of those "that go down to the sea in ships."

Since the dawning of the present century there has been much good done. Many lifeboats have been placed on dangerous parts of the coast, and by this means numerous and valuable lives have been saved. Lighthouses have also increased in numbers, and been rendered more efficient by the application of modern inventions. There are other beneficial agencies at work: for instance, the entrances to several harbours have been materially improved: at the mouth of the Tyne a gigantic work is in progress, which, when completed, will make this one of the finest harbours in the kingdom. The exertions and large expenditure of the late Marquis of Londonderry have made at Hartlepool a tolerably safe port in a storm; but, until the great sea-wall and embankment at Tynemouth be finished, the "Black Middens" and the "Herd Sands" will continue to be places of destruction to both life and property. At present, the entrance to the port of Shields is only passable through a very narrow channel, and this is not available except at certain states of the tide; and, in rough weather, the ships, which are often brought here in the hope of shelter, are cast either on the rocks or the opposite sand. If we had the means of obtaining the particulars, the number of men who have perished within sight of the ancient priory since the days of Queen Elizabeth would form a terrible list. Tradition says that, from time immemorial,—probably as far back as the Roman occupation of England, and during the occupation of the promontory by the prior and monks of Tynemouth,—there was a pharos or beacon placed here to the south of the modern lighthouse. Not only has all trace of this disappeared, but the rocks on which it stood have crumbled away by the encroachment of the sea. In a new form the morning light still stands here; but, until about fifty or sixty years ago, this was rendered comparatively useless in conse-

quence of the want of another light on the inside of the bar, which would guide the ships through the dangers of the narrow water-course, and signal when the state of the tide would, even in calm weather, admit of the safe passage of vessels. This want has, however, been supplied, and other lights are placed along the east coast; but, at the date above mentioned, the coast from the Nore to the extreme northern point of Scotland was left in an almost entire state of darkness. Even now there is need of more lighthouses; and, notwithstanding all that has been done, the state of our sea-bounds is disgraceful to the greatest maritime nation in the world. Year after year the account of disastrous wrecks is sad to think of; and, while the most competent authorities are of opinion that a chief part of the loss might be prevented by the establishment of a sufficient number of harbours of refuge, the Board of Trade and the House of Commons discuss the question while our seamen are drowned by the hundred and our property lost to the value of millions. Mr. Lindsay has once more brought this important matter before the House of Commons, and reminded the members that, by a committee of that House in 1858, by a royal commission in 1859, and by a resolution of the House in 1860, the construction of harbours of refuge along the coasts of Great Britain was strongly recommended.

Previous to the above dates in 1852, a committee was appointed to inquire into the cause of the excessive loss of men and ships: the late Mr. James Wilson was the chairman of that committee, who reported that, in 1852, the tonnage of vessels, foreign and home, sailing inward and outward to and from British ports, amounted to thirty-nine millions of tons; and they estimated that from 1852 to 1856, the number of ships lost amounted to 5,328, and that the lives of the men lost with those vessels amounted to 4,184. The substance of the report of this committee was as follows:—that "considering what constitutes the chief cause of commercial greatness of this country, and considering the enormous risk to which life and property are exposed, there is no object to which public money can be more beneficially and humanely applied than that of the construction of harbours of refuge."

When we find that, in the course of the time above mentioned, over five thousand ships and more than four thousand sailors have perished, and that the value of the property wrecked is estimated at two millions and a half in each year, it becomes most important that we should consider how much of this might be saved by the completion of the harbours of refuge which have been recommended by practical men.

After all, it is the matter of expense which is the main consideration, and whether the harbours shall be made at the national cost or by means of local rates. It is, however, clear that a large part of those charges should be defrayed by the Imperial exchequer, which might in the end be repayed by ship and other port dues.

In all works of this nature, when the skill and strength of man are brought to battle with the ocean, there always has been, and to the end of all time there will be, a degree of uncertainty in the matter of estimates; and Mr. W. Gibson, on the part of the Government, objected that the sum mentioned by the Commissioners would be insufficient for the intended purpose. According to the report of the Commission, the whole sum to be expended would be 4,500,000*l*., of which the Treasury was to find 2,350,000*l*. All that Mr. Lindsay asked the Government for was 134,000*l*. per annum for ten years. It was also urged that, especially in time of war, these harbours of refuge would be of as much service to the navy as to the mercantile marine. And, even looking at the question from a money point of view, if we admit that property to the amount of a million a year only would be saved by the construction of harbours of refuge, the investment would pay well.

The arguments advanced by Mr. Gibson against Mr. Lindsay's proposal were weak: nevertheless the proposal was lost by 58.

POST-OFFICE SAVINGS BANKS.—The deposits received in 1863 amounted to 2,649,919*l*.: the withdrawals were 1,026,207*l*., withdrawals including interest as well as original deposit. The principal and interest due to depositors at the end of 1862 was 1,698,302*l*., and at the end of 1863, 3,376,828*l*., or very nearly double the amount at the beginning of the year. The charges of management and expenses for the year 1863 amounted to 25,500*l*.

PROPOSED NATIONAL GALLERY, BURLINGTON HOUSE.

THE estimate of the sum that will be required for the proposed building, including finishing and decoration, is 152,000*l*. The site consists of about three acres and a half, of which one-half is occupied by Burlington House, with its two wings and its colonnade, and by the court-yard which they surround. Mr. Cowper says these buildings need not be disturbed at present, since the garden which occupies half of the site will furnish ample accommodation for the pictures, ancient and modern, belonging to the Trustees of the National Gallery, and also for the additions to the collections which may be expected by gift and purchase for many years to come. The main entrance of the new building will be through the central hall of Burlington House. The proposed building will be 300 feet long, and 218 feet wide. That part of it which will be devoted to the exhibition of pictures will be of one story, lit from the ceiling, and will provide 3,000 lineal feet of wall-space in a horizontal line, exclusive of doorways, and 36,000 superficial feet of floor space. The larger galleries will be 40 feet wide and 40 feet high; and the rooms for small pictures will be 21 feet wide, with a proportionate height. The only external elevation that will be visible will be at the northern side in Burlington-gardens, where the board-room and offices of the trustees and the residence of the keeper will be placed in two stories, and where there will be a public entrance. On the southern side, where the level of the ground is lower, there will be a basement story, and the whole building will be of fire-proof construction.

SCHOOLS OF ART.

AT the Southampton School, eight medals and three "honourable mentions" have been awarded on twenty works done in four months, and forwarded to London under the new regulations. Four of the rewarded works are selected for competition for national medallions.——From the Stroud School twenty-three works were sent for competition, and of these only eight failed in gaining medals, while eight have been selected for national competition. From Gloucester, twenty-three works were sent up, and ten medals have been awarded to the pupils, and six works have been selected for the national competition. Four medals and one "honourable mention" have been gained by students at the evening class at Gloucester, and several of the medal-winners at Stroud also belong to the same class.——The Cheltenham School has gained nine distinctions in the recent examinations. The works of three students are retained to compete for the national medallions.——To the Macclesfield School twenty-two local medals and one "honourable mention" have been awarded, and seventeen have been selected for national competition. Only twenty-eight drawings were sent.——By the Birmingham School thirty medals have been taken, and seven "honourable mentions" also awarded.——The Lincolnshire School has won twenty-two medals and ten "honourable mentions," and seven drawings have been selected for national competition.

THE LECTURE HALL OF THE LIVERPOOL INSTITUTE, MOUNT-STREET.

THIS hall, which is an amphitheatre, with a gallery, and containing accommodation for 1,200 persons, has recently been decorated according to designs supplied by Mr. H. B. Roberts, of the Liverpool Academy of Art, to whom the ornamentation of the Philharmonic Hall was entrusted on the last occasion, and whom the directors of the Institute engaged to devise and superintend the decoration of their lecture hall; and the painting and marbling have been executed by Mr. Davis, of Rathbone-street, the contractor. The following is a description of the work:—The ceiling is painted fawn colour, with border of double Greek key ornament in brown, and corners inlaid with red honeysuckle. The centre in white and gold, with red mouldings and band of blue and white, ornamented with purple honeysuckle. The chandelier is stone colour and gold. The skylights have been re-glazed with strong plate-glass, which diffuses a much greater and pleasanter light throughout the hall. The counter lights are painted Etruscan brown, the styles grey, with purple ornaments and gold mouldings. The large cove is painted pink, resting on a cornice of white and purple scroll-work, harmonizing with the walls, which are green. The doors of the gallery are purple, green, and gold. The pilasters in the niches are painted Sienna marble, and on each is placed a bust of some one eminent in science, art, or literature. Portraits of Mr. William Rathbone, Mr. Fawcett, and Mr. George Holt, adorn the walls of the gallery. The columns of the organ are painted in imitation of jasper marble, with white parian caps and gold mouldings, and resting on a base of porphyry, with panels of Egyptian green marble. The pipes are blue and gold; the cornice and arch white, gold, and pink, with frieze of blue and white ornament. In the gallery front the balusters are buff and gold; the pilasters buff and black, with grey and red styles: the frieze is stone-colour, inlaid with pink panels and purple ornament, in gold moulding. The light iron columns which support the gallery are encircled with strapwork ornaments and have caps of white and gold. The seats have been stained and varnished, the pads painted, and the body-seats are to be cushioned. Hitherto the hall has been used only for the lectures and meetings of the institution; but in future the public will be allowed to have the use of it, the Directors having determined to let the room for concerts, lectures, and public meetings.

EXCESS OF MORTALITY DURING THE WINTER.

THE Registrar-General's last quarterly return says;—Seldom has a winter been more fatal; for 143,030 deaths, 1,572 a day, were registered in 91 days. The mortality was at the rate of 2·773 per cent.; whereas the average of the season in the preceding ten years was 2·490 per cent.; thus the rate was nearly 28, instead of 25, in 1,000. 14,698 persons died in excess of the average number. Since 1842 it is only in the two winters (1847-48) after the potato failure, and in the winter of the Crimean war (1855), that the country has experienced any higher rates of mortality. The winter death-rate per 1,000 was 2,850 and 2·794 in the former years, 2·910 in 1855, and 2·773 in 1864. In unhealthy places, and in England formerly, when the land was undrained, and when zymotic matter soiled the air and waters more abundantly than it does in these days, the mortality was highest in the hot months of the year; but in the last quarter of a century the summer diseases have to some extent subsided, and left the mortality highest in winter, when the cold weather, in some proportion to its intensity, cuts off the weakly and the aged. London suffered to an extraordinary extent. The average annual rate of the winter quarter in London is 2·577 per cent., but in the last winter quarter the rate becomes 3·088, or ·511 above the average. The funerals increased in the proportion of five to six.

THE BRITISH ARCHÆOLOGICAL ASSOCIATION.

CHICHESTER CATHEDRAL.

AT the meeting held April 27th, Lord Houghton presided, and a large number of very interesting matters were exhibited, for an account of which we unfortunately have not space.

Mr. Gordon Hills, who was an eye-witness to the fall of the spire of Chichester Cathedral in 1861, as our readers know, called the attention of the society to some very curious particulars relating to the subject. He alluded to the prevalent opinion, supported by the historians Hay and Dallaway, that the north-west tower of the cathedral had been battered down in 1642 by Sir Wm. Waller, the Parliamentarian general. Mr. Hills showed that the destruction of the tower could not have taken place at that time; but the exact period of its occurrence was left in doubt. This doubt he has been able to clear up. The Rev. C. A. Swainson, canon of Chichester, has furnished Mr. Hills with the particulars derivable from a MS. in the handwriting of Dr. Thomas Haley, preserved among the archives of the cathedral chapter-room. Dr. H. was prebendary of Heathfield in 1704, canon residentiary in 1712, and dean in 1755. The MS. consists of a copy of the paper written in 1684, in Dr. Ede's handwriting, being "An

Account of Sir Christopher Wren's Opinion concerning the rebuilding of one of the great Towers at the west end of the Cathedral (one-third of which, from top to bottom, fell down about fifty years since), which he gave after he had for about two hours viewed it both without and within, and above and below, and had also observed the great want of repairs, especially in the great west tower." The report bears the date of 1684, the year in which Wren was by letters patent made Comptroller and Principal Officer of the Works in the Castle of Windsor. It shows that the tower fell about 1634. Sir Christopher actually proposed to clear away the ruins of the fallen north-west tower, and also to pull down the corresponding one in the south-west, and shorten the nave by one arch, and to substitute "a fair-built west end" of his own design; and it is satisfactory to think that the dean and chapter practised greater economy than the architect advised, and let it alone altogether, by which we are still able to look upon the south-west tower, though condemned a hundred and eighty years since.

The remainder of the evening was occupied in the reading of an elaborate paper by Mr. Geo. Wareing Ormerod, "On the Hut Circles of the eastern Side of Dartmoor," derived from long and continued examination and survey, difficult to explain without the numerous plans, drawings, &c., with which it was accompanied. It will form a useful pendant to Sir J. Gardner Wilkinson's papers on Dartmoor, already printed in the journal.

INSTITUTION OF CIVIL ENGINEERS.

AT the meeting held April 26th, Mr. J. R. M'Clean, president in the chair, the first paper read was "On the Structure of Locomotive Engines for ascending Steep Inclines, especially when in conjunction with Sharp Curves on Railways," by Mr. J. Cross.

The second paper read was "On the Impedimental Friction between Wheel-tires and Rails, with Plans for Improvement," by Mr. W. B. Adams. The author thought that the chief source of destruction in rolling stock and permanent way, apart from disproportionate weight, arose from the blows and friction between the wheel-tires and the rails—that was, jumping and sliding. This conclusion was verified by the contrary results practically obtained on the main line of the North London Railway at Bow. He considered that the best mode of preventing the blow was to provide for elastic resilience immediately over the tire beneath the wheel, and immediately under the rail, taking care that the rail-joints were elastically supported by fishes of sufficient depth; a continuous elasticity which could only be obtained by discontinuous supports, as with the double-headed rail on an elastic base—the flat-footed and bridge rails with continuous supports not being adapted for it; and that the rail thus elastically supported should be in itself as rigid as possible. On the North London line, this desirable result had been obtained, by laying down longitudinal timbers on the ordinary cross-sleepers, and spacing the rail supports not on the cross-sleepers but between them; the cross-sleepers being packed, and the longitudinals unpacked, so as to yield elastic action. In a lapse of nearly two years and a half, the ordinary iron rails laid on this system were undamaged, and the cross-sleepers firm and unmoved, in marked contrast to the rails laid in the ordinary rigid way.

LONDON MAIN DRAINAGE.

AT a recent meeting of the Metropolitan Board of Works, the engineer (Mr. Bazalgette) reported that, at the present time, about one-sixth of the metropolitan sewage was intercepted by the Northern Outfall Sewer works, and discharged into the Thames at ebb tide at Barking, whence it was carried to the sea. This sewage, about 14,000,000 gallons in quantity, was formerly discharged into the river within the metropolis at low water. The progress made with the Main Drainage works was thus stated:—On the Main Drainage Middle Level Sewer, work to the amount of 306,000*l.* had been done; on the Western Sewers, 3¾ miles of sewer had been constructed at the cost of 51,000*l.*; at the Northern Outfall Reservoir works had been executed to the estimated cost of 163,000*l.*; at the Southern Low Level Sewer, 3¾ miles of work had been completed at the cost of 110,000*l.*; at the Southern Outfall works at Crossness, work to the amount of 213,000*l.* had been finished. With respect to the Northern Thames Embankment, the engineer reported that the works of the first contract, (from Westminster-bridge to the east side of Cannon-street) had been much delayed by the difficulty in obtaining possession of the wharfs on the side of the river, and by the necessity there was for making experiments as to the best form of iron caissons for excluding the tide. Works had been done on this contract to the amount of 30,000*l.*, and on the second contract (between Waterloo-bridge and the eastern side of Temple-gardens) to the value of 12,000*l.*

ST. JOHN, NEW BRUNSWICK.

WITHIN the last four years, New Brunswick, and more particularly St. John, has been making a marked progress in architecture. In the country, numerous summer residences, and some churches, of a good though simple style,—Gothic modified to suit the climate of the province,—have been erected, and each year adds to the number. Near St. John, the residences of Mr. William Thompson (Mr. Stead, architect) and Mr. T. W. Daniel (Mr. J. A. Munroe, architect), are perhaps the best.

In the city, the new Roman Catholic Cathedral (Transition) and the bishop's residence (Perpendicular), are the best specimens of Gothic; and the stores of Messrs. Doherty & M'Tavish, Hall, and M'Cullough (Mr. Stead, architect), and Messrs. Ennis & Gardner, Ray, and Beard & Venning (Mr. Munroe, architect), of Italian. Some good residences and public buildings are scattered over the city. The new buildings are generally either of brick or stone, wood being used only for small houses.

The St. John gymnasium, in course of erection, is the first of the kind in the province. Mr. Munroe is the architect. The building is 40 feet front by 100 feet deep, and is built of wood; and, when finished, with baths, closets, sinks, &c., will cost 3,000 dollars (about 600*l.* sterling). The heating apparatus will consist of pipes for steam running around the building.

Our correspondent writes,—"The great evil we have to contend with is remodelling old buildings with stories 8 feet high. All St. John wants, to make it second to none of the colonial cities, is large fires; for people would rather spend 2,000*l.* on an old shanty, than build a new building for 1,800*l.* We have just established a school of design: it numbers some thirty members, intelligent mechanics of different trades, and is rapidly increasing in popularity."

NEWS FROM SCOTLAND.

Elgin.—An extensive and improved farm-steading has been erected at Drumbain, near Rothes, on the road from Elgin to the Spey Valley. The new steading is built on the site of the old one; but it covers so much more ground that it has been necessary to make an excavation, to the depth of 8 or 10 feet, into the hillside, in order to preserve the level of the foundation. The steading, as fully described in the *Elgin Courant*, may be said to consist of three squares joined together. First, there is the principal square built into the hill-side. This division contains the mill and barns, the granary, stable, cart-shed, and other offices. Next, there is a square in the same line containing the byres and the dung court; and, running back at right angles from this, are the cattle-sheds and courts for the accommodation of young stock. All these divisions are slated with very fine blue slate, and they differ in height according to the purposes which they are intended to serve. The first division is a story and a half high, with the exception of the thrashing-mill, which is two stories in height. This division measures 115 feet in length by 109 feet in breadth outside the walls, and contains inside a clean court 66 feet by 73 feet. The entrance to this court, and to the offices ranged round it, is by a gate 11 feet wide and 7½ feet in height. Going into this court, which is as well paved and as clean as the best streets in some cities, the stable is on the right, the cart-shed on the left, and the thrashing-mill and straw barn in front. The stable contains thirteen stalls, and is fitted up with the utmost regard to the convenience of the horsemen and the comfort of the animals. It is lighted with moderator lamps and paraffine. The lamps are enclosed in glass lanterns as a security against fire, and are balanced on pulleys from the joisting, so that the light may be moved up high or brought down to the floor if required. There is a plentiful supply of water brought in pipes to every part of the steading. It is introduced into the stable, outside of which there is also a large watering-trough for the use of the horses. Each man is provided with a chest to hold his horses' corn under lock and key; and in the angle of the stable, which occupies a side and a-half of the square, there is a harness-room, where every man has a trace on which to brush up his horses' harness. Immediately above the harness-room, and approached from it by a stair, is the ploughmen's sleeping apartments, which are ceiled and plastered. There are a bed-room and a dressing-room where the men may keep their clothes and dress themselves. A supply of water can at any time be had from a pipe which is introduced into this room. The sleeping-room, while it is made as comfortable as a place of the kind could well be made, is so constructed that if any of the horses should make a noise during the night, the men have only to open a small window looking down on the stable to satisfy themselves of what is wrong. The straw barn will hold at least 120 quarters of straw. It is 18 feet in width by about 60 feet in length, and, with a story and a-half of walls, is open up to the apex of the roof.

Wick.—The works in connexion with the new harbour are now advancing. The service railway from the quarries to the breakwater is almost completed, and a great quantity of plant and machinery is laid down to be ready for operation. Already about 200 feet of the breakwater have been laid down, and the staging on which the waggons are to run for pushing it seaward is erected for that distance. It is expected that other 600 feet of the work will be finished during the season.

Slamannan.—The Free Church here, which was built only two years since, has been completely destroyed by fire, which (as usual) originated in the stove, communicating, it is believed, with the woodwork in a corner of the gallery. The building was insured to the extent of 500*l.*

COMPETITIONS.

The Southport Cemetery.—The Improvement Commissioners of Southport have awarded the first premium to the plans sent in by Messrs. Blackwell, Son, & Booth, architects, for the laying out of the intended cemetery at that place, and the erection of the necessary buildings. The principal entrance to the cemetery is in Duke-street, and is flanked on one side by a residence for the superintendent, and on the other by a porter's lodge. The extent of the cemetery is about 9 acres. Two semi-detached chapels, for the Noncomformists and the Church of England, are placed in the centre of the plot, and are approached directly from the principal entrance; whilst, immediately on entering, a winding road conducts to the Roman Catholic chapel, which stands on the south side of the plot. The semi-detached chapels are divided by a clock tower about 50 feet in height, on both sides of which are vestries leading to the chapels; and on the other side of the vestries are entrance porches for mourners. In connexion with each chapel is a mortuary for the reception of the coffins, and this is divided from that portion of the chapel occupied by the mourners by glass folding-doors, which will admit of the coffins being seen. The style of architecture adopted for the lodges is domestic Gothic, and that for the chapels is Continental Gothic.

Hackney Town-hall.—In the *second* competition for this building only four designs, according to the *Hackney Independent*, were sent in. From these a design by Messrs. Hammack & Lambert has been selected.

IRELAND.

The Clonmel School of Art.—This school has just been visited by Mr. Moodie, an officer from the Science and Art Department, and the students have undergone the usual examination. The inspector expressed his surprise at the low attendance at the school, especially of the artisan class. He stated that in England the artisans were most assiduous in their attention to the schools of art, as the knowledge there afforded was sure to advance them in their various employments, and thus procure for them a higher

rate of wages. He was sorry to perceive that the same influence did not appear to actuate the Irish artisans. Mr. Moodie also remarked on the indifference to art education, exhibited by the friends of the elementary schools, where, notwithstanding the great encouragement afforded by the Department, only one school, that is the Model School, was in connexion with the school of art. Alderman Hackett informed the inspector that the success of a school of art in Clonmel was much hindered by the absence of manufactories, and of the consequent demand for the service of the designer and draughtsman, and that at present the artizan class were suffering from a scarcity of employment in the various departments of buildings, so that many were leaving the country.

The National Model Schools.—A Parliamentary paper, moved for by Mr. Pollard Urquhart, M.P., contains tabulated details respecting twenty-seven model schools. The expenditure on the central model schools is omitted, as also that on the West Dublin model schools. The aggregate expense of the other twenty-five establishments is 136,315*l.*, or an average of 5,452*l.* each, the Belfast model school having cost 12,453*l.* The twenty-seven model schools in operation cost 30,971*l.*, or an average of 1,147*l.* each, the cost of the larger establishments standing thus:—Central model, 3,416*l.*; Belfast, 4,516*l.*; Londonderry, 1,044*l.*; Newtownards, 1,606*l.*; West Dublin, 1,305*l.*; Limerick, 1,255*l.*; Galway, 1,246*l.*; Waterford, 1,020*l.*; and Trim, 1,007*l.* During the year 1863 the number of different pupils that passed through the schools was 16,768,—3,214 in the central model school, 2,805 in Belfast, 1,054 in West Dublin, and 105 in Enniscorthy. The daily average attendance ranges from 1,388 in the central model, 1,215 in Belfast, 427 in West Dublin, to 95 in Sligo, and, lower still, 52 in Enniscorthy.

PROVINCIAL NEWS.

Andover.—Mr. Gue, of this town, builder, has obtained the contract for building the new London and County Bank in the High-street. The sum agreed upon is 1,959*l.*

Penzance (*Cornwall*).—The chief stone of the Penzance Public Buildings has been laid with some ceremony.

St. Ives.—The following tenders have been received for the erection of the new Corn Exchange on the Market-hill. Mr. Hutchinson, the architect, was instructed to have the work commenced immediately:—

Allen	£2,177 0 0
Cock & Jenkins	1,790 0 0
Saunders	1,685 0 0
Thackeray & Son	1,527 0 0
Thompson	1,520 0 0
Allpress	1,433 0 0
Bunting & Son (accepted)	1,409 0 0

Messrs. Bunting & Son have commenced operations by pulling down the buildings purchased for its site.

Hereford.—A building at the cathedral-end of King-street, formerly in the occupation of a cabinetmaker, has been restored in the olden style of such buildings in Hereford, with external carvings and ornamental mosaic work in the windows and balcony. In Gwynne-street, adjoining, also, some street improvements have been carried out. The whole of these works have been done by Messrs. Ford, from designs by Mr. E. H. L. Barker.

LABOURERS' COTTAGES COMPETITION.

SOCIETY OF ARTS.

THE following is the report of the judges appointed to decide on the competition for prizes for designs of cottages for the labouring classes, offered by Mr. J. B. Denton, through the Society:—

"After a careful consideration of the designs submitted to us, numbering in all 134, from 107 competitors, residing in all parts of the United Kingdom, we feel it incumbent on us to offer a few remarks in explanation of our decision.

We would observe, in the first place, that although the terms of the competition are such as to limit our attention rather to small matters of detail, affecting the stated cost, than to permit our actually selecting the best design which could be built for a reasonable outlay, we have given our consideration to the whole subject of cottage accommodation for the labouring classes.

Notwithstanding that the offer of these prizes has been the means of procuring so large a number of designs, we cannot but consider that no satisfactory solution of the problem proposed has been given. The possibility of erecting really good and substantial cottages for the labouring population of this country generally, with the stated accommodation, at a cost not exceeding 200*l.* a pair, all profits and expenses included, is not demonstrated by the present designs. This is shown by the remarks of the competitors themselves, and by the shifts they have found themselves obliged to adopt in order to reduce the cost, as well as by those exceptional cases where, owing to some peculiarly favourable circumstances, or by omitting some feature not so important in one locality as in another, a result somewhat approaching that which is desired in the cost has been arrived at; not in any case, however, without contravening the terms of the competition in reducing the given prices of certain items.

We particularly mention good and substantial cottages of the given dimensions, for it is to such alone that our attention has been directed, as it cannot be the desire of the donor of the prize, or the wish of the Society of Arts, to encourage the erection of cottages of an inferior character. We have in all cases taken the cost of cottages to be erected in pairs, it being obvious that a better building can be provided for a stated sum when attached to a similar one, and thus the cost of some of the walls, roofs, &c., divided between the two. On the other hand, the cost of a row of ten pairs of cottages can hardly be taken as a fair criterion of the value of a single pair, a group generally much more frequent and desirable than the larger number.

Several items are included in the terms of the competition which we think should have been more clearly defined or excluded altogether from the estimate; for it is obvious that the words "water supply, well, fencing, paving, &c.," may be taken to imply very different items of expenditure by different individuals in a competition. Again, while brickwork as a material for walls of cottages is almost unknown in some parts of the country, it is obvious that rubble walling must be reduced to value in the terms of brickwork to get at a fair comparison of the cost according to the terms of the competition; and similarly, roofing, if of tiles, must be valued as slates at the given price.

The paragraph referring to the height of rooms seems to have been differently understood by the competitors, the word "clear," at the end of the sentence relating to this matter, having been taken by some to mean the height of the ground-floor up to the ceiling, while the generality of designs allow only 9 feet, including the thickness of ceiling, upper floor joists, and flooring.

It is true that in some parts of England, where bricks can be obtained at from 18*s.* to 20*s.* a thousand on the spot, and where certain facilities exist for obtaining other materials, where timber is inexpensive and concrete foundations are scarcely required, a certain kind of cottage may possibly be erected for the sum named in the instructions (though generally speaking it is not so), but it would be highly improper, without the addition of considerable improvements, at increased cost, to recommend such cottages as fit to be erected for the occupation of the labouring classes generally.

Of all the plans submitted, therefore, none can be said strictly to conform to the terms of the competition, both as to the accommodation required and the cost. To none, therefore, can we, strictly speaking, award the prize. We, however, deem the design marked by you as No. 23 to be, on the whole, the one most conformable to the terms of the instructions, as well as to the proper requirements and conveniences of a labourer's cottage, and, therefore, we recommend that the prize of 25*l.*, open to the United Kingdom, be awarded to this design.

It must be understood as our opinion, however, that, generally speaking, brickwork of 9 inches thick for outer walls in exposed situations is not sufficient to resist the weather, and therefore we should recommend some system of hollow walls to be adopted, which would of course add to the cost. With reference to this we would call attention to the remarks of a competitor (No. 71), to which we quite assent. He proposes to build the cottages shown in his design in 9-inch solid brickwork, the stipulated cost not allowing him to make them of greater thickness, and adds, 'Should it be thought advisable to increase the expenditure for this purpose he would recommend hollow walls built in brickwork, the space between being 2½ inches, and the walls bonded together with wrought-iron ties.' It is only fair to observe that several other competitors (as Nos. 2, 14, 30, 81, and others) show various systems of hollow walling, or some kind of hollow bricks.

Though not specially mentioned in the instructions, an oven is, we consider, often a matter of importance; and, if made common to both cottages (as in Design No. 71), may be added without any great expense.

We cannot recommend the ordinary water-closet apparatus with cistern-pipes, &c.—so liable to get out of order—for general adoption in ordinary labourers' cottages. A modification of this by the use of a common syphon pan, with the ordinary privy or cesspool, will be found sufficient; and when, by means of ashes, clay, or other deodorising substances thrown into the pit, the loss of the soil is prevented, the matter is not unimportant.

The use of cast-iron casements, as in Design No. 23, is not desirable, owing to the difficulty of making and keeping them water-tight, their liability to fracture, and the difficulty of repairing them. We should recommend sashes or casements in wooden frames, and no lead lights for other than ornamental purposes.

The internal walls of some of these designs are not plastered, thus evincing an attempt to save cost. Perhaps, in some cases, with very good bricks, and in certain localities, plastering may not be required; but generally speaking it is desirable to plaster the bedrooms and living rooms of cottages.

In some of the designs the living-room floors are described to be common flat brick paving. Good paving tiles at least should be used, but we consider wooden floors, for the living-room as well as the bedrooms, generally indispensable to the comfort of the inhabitants.

The Design No. 23 shows well-ventilated pantries and good coal-stores; also a well, common to both cottages, and a rain-water butt.

The partitions shown in some designs (particularly No. 71) in the upper floors, of ¾-inch boarding only, are not sufficient except, perhaps, next the staircase. The separation between the rooms should be of a more substantial character.

Design No. 23, to which we award the chief place, would be greatly improved by dormers over the upper windows at the back, so as to give greater space for light and air to, as well as to improve the appearance of, the cottage.

In all cases when the sloping parts of slate roofs especially (and generally also of tile roofs) are made a portion of the ceiling of the upper rooms, some plan should be adopted to check the access of heat and cold.

It is stated that cottages of the same design as No. 31 are being erected in large numbers in Yorkshire at a cost within the amount stated in the terms of the competition; but we find in the estimate that the brickwork is taken at 6*l.* a rod instead of 8*l.*, as in the instructions, and other work at proportionately low prices.

With regard to the prize offered specially to the members of the Architectural Association, the number of designs sent in is small in comparison; and we regret to observe that the attempt to conform strictly to the terms of the competition as to cost, seems to have led to the sacrifice of essential conveniences and comforts, although there is no design which we can say has successfully met the instructions even in this respect. Either in substituting tiling at a flat pitch for slates, or by reducing the heights of some rooms, or placing the water-closet inside the walls of the house, or in some other way, attempts have been made to meet the instructions, which only serve to preclude the possibility of our recommending any of the designs submitted for the prize, or of according to them our commendation as generally fit to be adopted as dwellings for labourers, without a variety of improvements.

We would observe, however, that No. 15 offers a suggestion deserving of remark, as it submits a plan with one of the bedrooms on the ground-floor, whereby the size of the upper rooms is increased and the boys and girls of the family are more completely separated. Only one door to the house is provided, and the scullery is reduced in size. This plan obviates in a measure the difficulty arising from the area required for the upper floor of a cottage with three bedrooms on that floor generally exceeding the area actually required on the floor below. Such an arrangement as this may be desirable in some localities, but it is not contemplated in the instructions. This design is shown as roofed only with pantiles at a low pitch. The general plan of No. 29 is, upon the whole, good; but the elevation as shown cannot be commended, unless the improved elevations, as sketched in the alternative design, were adopted, which would then bring the cost considerably beyond the stated sum.

In fine, we may observe that although good cottages may possibly be erected, under favourable circumstances, in some parts of England for a lower sum, we consider the probable average cost of a pair of cottages built with the conveniences we have enumerated would be about 280*l.* to 300*l.*, and that the attempt to erect them at any considerable reduction upon this amount must result in some inferior kind of buildings, discreditable to the owner, and wanting in much of the necessary accommodation for a labourer and his family.

We would further remark, in conclusion, that there are other advantages besides the mere per-centage on the outlay which must be looked for to remunerate a cottage builder for his expenditure on improved dwellings,—advantages nevertheless capable of being estimated at a pecuniary value, such as proximity of the labourer to his work and consequent saving of time, &c., amounting often to quite as much cash value as half the rent of the cottage; but especially the moral and physical welfare of the tenants, and the proper sanitary condition of their dwellings. These latter considerations, after all, are those which give so great an importance to the subject, and which have prompted us to give especial attention and care in deciding what may at first sight seem but a simple matter.

C. F. HAYWARD, Architect.
G. DINES, Builder.
J. CLUTTON, Land Agent."

The name of the successful competitor (No. 23) is Mr. John Birch, 51, Holywell-street, Westminster, to whom the Council have awarded Mr. Denton's prize of 25*l.* and the Society's silver medal, in accordance with the above recommendation.

COMPETITION, NEW MUSEUMS, SOUTH KENSINGTON.

WHILE the decision of the committee was in abeyance in this competition, it was, perhaps, as well to abstain from remarks on the subject of the infringement of the conditions with respect to the finishing of the drawings, because it might have been expected that the extent to which this has been carried in the first premiated drawings, in colouring instead of light brown Indian ink, could scarcely have escaped their attention.

It is not, of course, that the mode of finishing affects the merits of a design, *per se*; but it gives a most unfair prominence frequently to mere pretence and meretricious ornament over more meritorious and modestly finished drawings.

Without descending to the more minute though important process of lighting, which a very cursory inspection of these drawings shows to be exceedingly defective, there are two points which deserve especial remark.

First, that from the vagueness of the instructions, and the authorities simply referring back to them, such of the competitors as asked for further information, the difference of opinion as to the intentions of the Government was such, that while some of the competitors, including the first premiated, went in detail into the scheme for the whole site, and gave "full" perspective views of the principal front next Cromwell-road, 1,100 *feet long*, a large number believed themselves restricted by these instructions to the eastern side of ground only, and gave "full" perspective views of the façade, 600 *feet long only*, next Exhibition-road. Between designs so circumstanced no fair comparison could by any fair possibility be instituted.

Secondly, and it is a point of great importance to the Government as well as to the competitors, the instructions restrict the Natural History Museum to the *eastern side* of the site only, and clearly imply that it must be self-containing within those limits. Now as Captain Fowke places the lecture-hall, library, and even the entrance-hall, in the *central block* and on the *central axis* of the building, either the Natural History Museum must be constructed *without* these necessary appendages, or the Government, by commencing at all, commits itself at once to the whole scheme, and to a building which cannot be completed under 1,500,000*l.* The instructions clearly imply that they are anxious to avoid this necessity.

The modifications exhibited are equally illusory; each consisting in leaving out some essential point; *e.g.*, the *museum* without the *library*, *lecture-hall*, or even *entrance-hall*, or these *without* the *museum*. Now, the very essence of a modification consists in this, that though reduced in size, it is complete and self-containing in itself.

It is inconceivable how the committee can have overlooked these points.

AN ARCHITECT.

THE COFFIN OF EDWARD THE CONFESSOR.

THE following very interesting entry—relating to one of the most eminent of our Anglo-Saxon kings—has *never before been published*, nor referred to, nor ever imagined to exist. I found it (some seven years back) in the Accounts of the Paymaster of Works and Buildings, belonging to the Crown, during the reign of King James II.:—

"Paid to Mathew Bankes, for a large coffin by him made to enclose the body of St. Edward the Confessor, and setting it up in its place, in the year 1685,—6*l.* 2*s.* 8*d.* And to William Backe, locksmith, for large hinges and rivetts, and 2 crossebarrs for the said coffin,—2*l.* 17*s.* 7*d.*"

Lord Macaulay would doubtless have made use of this illustration of the religious character of the last of our Stuart kings—as he would have made like admirable use of the removal, by King William III., of Grinling Gibbons's Whitehall Chapel altar-piece—from Inigo Jones's Whitehall to the position it still retains in the Chapel of Hampton Court Palace; a fact alike significant and important, which I had the good fortune to discover and to make first known to the public in the columns of the *Builder*.*

"I have seen" (says Keepe) "a large chest or coffin, bound about with strong bands of iron, lying about the midst of the inside of this shrine, where I suppose the body of the pious Confessor may still be conserved." Keepe's work was published in 1681; and four years after, at the taking down of the scaffolding, erected for the coronation of James II., a hole was either accidentally or purposely broken in the lid of the Confessor's coffin. "On putting my hand into the hole" (says Keepe), "and turning the bones which I felt there, I drew from underneath the shoulder-bones a crucifix, richly adorned and enamelled, and a gold chain, twenty-four inches long." The crucifix and chain of the *last but one* of our Saxon kings were accepted by *the last* of our Stuart kings. Their destiny is, I believe, unknown.

This is the whole account we have of this discovery and its appropriation—a passage in "Bishop Patrick's Autobiography" (p. 191) excepted, with which, however, I will not trouble your readers.

PETER CUNNINGHAM.

SCULPTURE EXHIBITION AT THE ROYAL HORTICULTURAL GARDENS.

SIR,—As a letter addressed to the Sculptors' Institute by the Royal Horticultural Society, the original of which I received only on the 3rd instant, was inserted in your paper of last week, I deem it my duty to state that the reason why the Sculptors' Institute have thought proper to withdraw their support from the proposed exhibition of sculpture is, that the arrangement propounded to them in the first instance by the late lamented Prince Consort, and carried out last year, has been abandoned by the authorities of the Gardens, and a code of rules substituted of a character not in accordance with the views of his Royal Highness.

EDW. B. STEPHENS, Hon. Sec.,
Sculptors' Institute.

NEW PATENT DIRECT-ACTING STEAM-HOIST.

A NEW machine, for the purpose of raising weights, driving piles, and general hoisting purposes, has been tried at the works of Messrs. Peters, Brothers, Portwood, in the presence of gentlemen interested in this class of machinery, and of engineers from London, deputed to report upon the merits of the machine, which is the invention of Mr. A. B. Brown, C.E., of the firm of Scott Burn, Brown, & Co., of London. Most of the ordinary loss of power is avoided, the only wearing parts being reduced to a piston and piston-rod. Steam is admitted from a small tubular boiler, into the cylinder at a high pressure, and is thus permitted to exert its expansive force directly upon the rope by which the weight is raised. The whole machine, is portable and upon wheels. In one of the trial experiments, weight, being at once freed from all resistance, fell at the natural velocity, and descended like a blow from a hammer. The weight lifted was 5 cwt., the speed 900 feet per minute, the indicated pressure of steam 70 lb. to the square inch. Eleven blows per minute upon a pile were represented; and it is the opinion of the inventor and constructors that, with a larger steam-producing surface, a speed of from eighteen to nineteen blows could be obtained. The concluding part of the trial was to display its power as a general hoist for warehouses, wharfs, mills, and other manufactories. The operation of the machine itself is reported as almost without noise. The trial was considered satisfactory.

* *See* the *Builder*, Nov. 8, 1862, p. 798.

CHURCH-BUILDING NEWS.

Cambridge.—The chief stone of the new chapel of St. John's College has been laid. The chapel has already progressed considerably. The architect is Mr. G. G. Scott. Messrs. Jackson & Shaw are the contractors.

Thetford.—The church in this hamlet is now completed, after restoration and re-seating, and will shortly be re-opened for divine worship. The work has been carried out by Messrs. Freeman, of Ely, as contractors, from designs of Mr. J. Ready, of London, and the cost will be defrayed entirely by the family and friends of the rector, the Rev. H. H. Baber, of Stretham.

Stow.—Operations have at length been commenced for the necessary repairs required by the state of Stow Church. The work has been resumed at the point where the restoration of the choir left it twelve years ago, viz., with the Saxon piers of the tower next the chancel. As the work to be done is of a nature which does not admit of its being let to a contractor, careful workmen are employed in carrying it on under the eye of the incumbent, with the assistance of the architect and a clerk of the works. Some liberal donations have recently been added to the restoration fund from influential persons in the county.

Harleston.—The roof of the chancel of Redenhall church, which was in a somewhat decayed state, has been replaced by a new one, of similar design as the original, which belonged to the Decorated period. The whole has been executed in English oak by Mr. C. Godbolt, of Harleston, under the superintendence of Mr. R. M. Phipson, architect. A debased window, altar railings of the staircase baluster style, and a west gallery blocking up the lower arch, still exist; but these will gradually give place to better things.

Bedford.—The first meeting of a general committee for the restoration of St. Paul's church, Bedford, has been held at the Shirehall, according to the local *Times*, when resolutions were passed to the effect that the present condition of the church renders it highly desirable that steps should be at once taken with a view to its complete repair and restoration;—that to carry out such restoration a considerable expenditure must necessarily be incurred, towards which a sum of about 4,000*l.* has been already promised;—and that Mr. R. Palgrave, jun., be appointed architect. A working committee was appointed to carry out the objects contemplated.

Newbury.—A new chancel is about to be erected to St. John's Church, Stockcross. This church was erected about twenty-five years ago. The chancel at present is only about 7 feet deep, by 15 feet wide: it will be when completed 27 feet deep, by 18 feet wide. The plans have been prepared by Mr. Hyllier; and Mr. Low, of Speen, by whom the church was built, has taken the contract for this extension.

Llanelly.—A new Welsh church is about to be built on Glanmor Park estate, near the seaside, Llanelly.

Liverpool.—The foundation-stone of the Church of St. John's has been laid at Waterloo. The new church, according to the *Journal*, is to occupy a triangular piece of land at the upper part of Wellington-street, Waterloo North. The building will be of a simple and comparatively inexpensive character—the architecture being early English. Externally the church will be built of Yorkshire shoddy, with Stourton-stone dressings. The roof will be pointed, and the only addition in the way of ornament is a small bell turret which surmounts the west gable. The church is intended at first to accommodate about 600; but, when required, enlargements can be made by the addition of north and south transepts, which will accommodate about 300 more. The dimensions of the nave are 62 feet by 37 feet, and of the chancel 30 feet by 20 feet. The roof will be of open timber-work, stained and varnished, of one span. Mr. Culshaw is the architect, and the building contract has been left to Mr. T. Smitton, of Seaforth. The total cost of erection and endowment is estimated at 4,200*l.*

Books Received.

Engineering Facts and Figures for 1863. *An annual Register of Progress in Mechanical Engineering and Construction.* Edited by ANDREW BETTS BROWN, Mechanical Engineer. London and Edinburgh: A. Fullarton & Co., 1864.

THIS book is a product of the noble art of wielding the scissors and paste-brush. It is a reprint of selections from the articles published last year in the *Engineer*; the *Mechanics' Magazine*; the *Practical Mechanics' Journal*; the *Engineer and Architects' Journal*; the *Chemical News*; the *Scientific American*; and the *Builder*. The compilation of these so-called "engineering facts and figures for 1863" must be founded upon three assumptions;—first, that Mr. Brown's sources are ever-running streams of facts; second, that the figures are always given; third, that engineering progress is completely recorded in the more or less ephemeral class publications of the day. Is this so? The editor's name would give one the impression that the tinge of his intellect is that of the autumn leaf—when, as Kingsley sings, "all the trees are brown." We should be inclined to assert that his predispositions are of a more youthful kind, and are of the present joyous season of the year (Gioventu—primavera della vita; primavera,—gioventu del anno):—

"When all the world is young, lad,
And all the trees are *green*;
And every goose a swan, lad,
And every lass a queen,"
* * * * *

But, instead of taking to boot and horse like the hero of Kingsley's lively and yet pathetic lyric, Mr. Brown rushes to the paste-brush and scissors. At the same time let us say that the articles chosen are very well selected from the special point of view of a mechanical engineer, and make a tolerably useful book. We notice, however, several misprints, which slightly alter the sense. Several names of foreign scientific grandees are also misspelt; *e. g.*, "Poncelef" for Poncelet; "Depretz" for Despretz; "Ruhlmann" for Bühlman (a very great difference to a German); and some other similar slips. For Mr. Brown's own sake, we advise him to spend his leisure hours with the true sources of mechanical knowledge; to, in one word, devote his time to getting up *one* subject well; and then, and not till then, to rush into print.

VARIORUM.

"HEROINES of the Household," by the author of the "Heavenward Path" (Hogg & Sons). This is a very interesting series of sketches of noble women of ancient and modern days, ranging from Monica, the mother of Augustine, to Miss Marsh, whose labours amongst the navvies will not soon be forgotten. It is well calculated not merely to interest young readers, but may suggest what many would gladly find,—a path of usefulness.——"The Steady Aim," by W. H. Davenport Adams (Hogg), is another book of examples and encouragements from modern biography. The author has found his subjects amongst all classes, inventors and discoverers, naval and military heroes, artists, authors, and men of commercial enterprise, choosing those who have become great by the adoption of a particular path in life, and following up that path with unfaltering resolution. It is useful to remember that,—

—— "The virtue lies,
In the *struggle*, not the *prize*."

——"Chasing the Sun," to name another reading book that has reached us (published by Nisbet & Co.) forms part of *Ballantyne's Miscellany*, the very good object of which we have previously mentioned. The present little volume describes familiarly some rambles in Norway.——The current number of the *Quarterly Review* contains an article on "Pompeii," founded on the reports of Signor Fiorelli, now at the head of the Royal Museum, and who was previously director of the works at Pompeii. Accounts of the more recent discoveries which have reached the English public only through the journals, are brought together, and their value is made evident. To check the habit of writing names upon the walls, Signor Fiorelli has ordered all names thus written to be published in the Naples paper which has the largest circulation. The *Quarterly* says, "he has been requested to furnish a list of those of our own countrymen, that they may be similarly exposed to public reprobation at home"!

Miscellanea.

MANSLAUGHTER BY ARTIFICIAL MANURE MANUFACTURERS. — An inquest has been held, in Wolverhampton, on the body of a young married woman, who lived near to the chemical and artificial manure works, in that town, of Messrs. Wildsmith & Gaunt. The deceased had complained several days of sickness and huskiness in the throat, caused by the sulphurous vapour arising from the works. Medical men were called in, and they found the house surrounded by a vapour of a peculiarly acrid taste. This they pronounced to be sulphurous acid gas given off from the works; and a *post mortem* examination revealed that the deceased died of inflammation of the lungs, which Dr. Henry Hancox, surgeon, who made the examination, believed was accelerated by the woman having inhaled the vapour in question. The jury returned a verdict of "manslaughter" against Messrs. Wildsmith & Gaunt, and those gentlemen were committed for trial, but admitted to bail. Previously the Corporation of Wolverhampton had commenced proceedings against them by indictment.

THE VALUE OF HOUSE PROPERTY IN SOUTH LONDON.—The following properties were recently submitted to public competition at the Mart, City, by Messrs. Charles & Henry White, auctioneers, of Kennington-cross, and after some spirited biddings were sold at the following prices:—Leasehold residence, 21, Trinity-square, Southwark, let at 35*l.* per annum; ground-rent, 12*l.* 1s. 6d.; unexpired term, 31 years, sold for 295*l.* Leasehold residence, 22, Trinity-square, Southwark, rental 42*l.* per annum, held at same ground-rent and term as above, sold for 300*l.* Two leasehold dwelling-houses, situate Nos. 1 and 2, Cottage-place, Vauxhall, Lambeth, held for about twenty years, at a net rental of 16*l.* 6s., sold for 75*l.* Twenty-five leasehold dwelling-houses, in Harris-place, Harris-street, Camberwell, let to weekly tenants at rents realising 260*l.* 8s. per annum, after deducting ground-rent, vendor paying taxes, held for an unexpired term of 76 years, sold for 1,750*l.*

DRAINAGE OF SALFORD.—A report on this subject by Mr. John Newton, C.E., Preston, to whom plans and reports of the borough and district surveyors had been referred by the Drainage Committee of the Salford Corporation, has been printed. Mr. Newton examined the locality previously to making his report, which is not in entire accordance with the recommendations of the borough surveyor; but the reporter urges the necessity of such works as those advised by the surveyor, or modifications of them, or others in lieu thereof, being forthwith undertaken, on sanitary grounds; the rate of mortality in the Salford district being excessive, and sanitary measures invariably resulting in a reduced death-rate. We regret to observe, however, that all idea of carrying out a great drainage scheme for Salford is abandoned. The objections urged in the council were two-fold—firstly, that the purification of the Irwell cannot be effectually carried out unless the co-operation of Manchester is secured; and secondly, that the allotment of the cost to the several districts of the borough was unequal and unfair. The proposed new works would, in all, have cost 39,374*l.*; of which 26,672*l.*, were for works to intercept the sewage from the Irwell and convey it to a proposed outlet away from the town, near Mode Wheel.

THE OSWESTRY NEW PUBLIC HALL AND INSTITUTE.—This building, which has recently been opened, stands on a site adjoining the New-road, not far from the railway stations. The front has a total extent of 50 feet. At the angle of the building rises a square tower to a height of 60 feet. The architecture is Italian, of a Florentine character, the effect depending chiefly on the treatment of the main cornice, the doorway, and the window-dressings. The materials used are stone from quarries at Shelvoke, and red pressed bricks jointed in black mortar. The sides of the building are of red brick, with white brick arches, and are relieved a little by a red brick cornice. They have a total length of 86 feet. The large hall, which occupies the upper floor, is a plain room, 36 feet in width by 83 feet in length, and 21 feet in height, and is capable of accommodating 700 persons or more. The architect was Mr. W. H. Spaull, of Oswestry; and the builder, Mr. R. Whiston, of Wolverhampton. The total cost of the building, with boundary-wall and fencing, which were not comprised in the first contract, will be about 2,050*l.*

OPENING OF ROMAN CATHOLIC CATHEDRAL, NORTHAMPTON.—The "Cathedral of our Lady and of St. Thomas of Canterbury" has been opened with the celebration of Pontifical High Mass, the preacher being Cardinal Wiseman. Mr. Pugin was the architect. The cathedral consists of a nave and north and south aisles or chapels. Over the high altar is a stained-glass window, representing our Saviour in the centre, with "our Lady" on the left, and "St. Thomas of Canterbury," to whom the church is dedicated, on the right. In the tracery of the window is our Saviour in heaven, and the lower part of the window is a representation of the old town of Northampton. The south chapel contains the sacramental altar, and the north is a memorial of the Japanese martyrs. There are several stained-glass windows and sculptured groups in the church, which is estimated to contain about 600 persons.

THE IRON WORKS AT ASHTON VALE, NEAR BRISTOL.—A new company is being formed for conducting the Ashton Vale Iron Works, and producing iron in a finished state, fit for the home or export markets. For some time operations have been carried on at Long Ashton, but the facilities for the complete production of iron have been awanting; the rough material, or pig-iron, being sent to Staffordshire and South Wales to be manufactured, at a total cost, including carriage each way, of from 14s. to 15s. per ton. It is now proposed, by a limited liability company, to introduce a large capital, and, by erecting the necessary apparatus, rolling mills, &c., to produce iron in a complete and finished state at Long Ashton, fit for supply to the iron market. The property comprises a colliery, and the means of raising the coal. The estimate of money required to erect mills, and to purchase and further develop the works, is 110,000*l.*

RAILWAY RETURNS.—The course of British railway revenue this year has been highly satisfactory. In the first quarter of 1864 the receipts were 7,102,378*l.*, as compared with 6,534,829*l.* in the corresponding three months of 1863, showing an increase of 567,546*l.*, or 8·67 per cent. The average extent of railway worked during the quarter was 11,151 miles, against 10,752 miles in the corresponding period of 1863, showing an increase of 399 miles, or 3·71 per cent. The receipts thus gained on the mileage during the past quarter to the extent of 4·96 per cent.

DUPPA'S PATENT BENCH DOG.—The bench dog manufactured by Messrs. Bailey & Co., of the Albion Works, Salford, appears to offer advantages over the primitive mode of securing a piece of wood on the carpenter's bench. The *Ironmonger* says of it, "When fixed it is sunk flush with the bench, and by turning the centre screw the toothed edge is raised up to the required height, so as to fix securely the piece of wood that is being planed, or otherwise operated upon. From the nature of the contrivance it effects this with much greater certainty than the old clumsy method usually employed, as there is no chance of slipping even with the thinnest plank, and, consequently, the progress of the workman is very greatly facilitated."

COMMITTEE ON METROPOLITAN SUBWAYS.—A Committee of the House of Commons, consisting of Sir B. Leighton (chairman), Mr. Du Pre, Viscount Grey de Wilton, Mr. F. S. Powell, and Mr. Floyer, the first three only being present, met, on Friday in last week, to consider a bill on this subject. Mr. Phinn, Q.C., opened the case, and Mr. Bazalgette was examined at great length by Mr. Wilkinson, as to the structure and facilities afforded by subways. The bill is opposed by all the gas and water companies of the metropolis.

THE LIVERPOOL BOROUGH SURVEYORSHIP.—A letter has been received by the local authorities from the borough surveyor, Mr. Weightman, stating that he has long felt that age and the necessity for more frequent relaxation incapacitate him for the due performance of the onerous duties of his office; and he now considers it to be his duty to place his resignation in their hands at an early date. Mr. Stewart, in referring to this letter, paid a high compliment to Mr. Weightman's ability and integrity.

THE LOCAL GOVERNMENT ACT IN OXFORD.—It has been resolved, at a special meeting of the local Street Commissioners, by a majority of 69 to 9, to adopt the Local Government Act in Oxford.

THE SHEFFIELD INUNDATION.—At a meeting of the General Committee of the Bradfield Inundation Relief Fund, it was stated that the subscriptions actually received amounted to 42,751*l.* odd, and that about 10,000*l.* more was known to be in the hands of the committees appointed in several towns. The total disbursements, so far, have been 19,811*l.* The following statistics were submitted to the meeting:—Number of widows caused by the flood, 11; orphans, 40; deaths, 250; persons relieved, 20,537; houses in the district, 4,953; houses flooded, 4,357; houses destroyed and abandoned, 798.

THE GALLERY OF ILLUSTRATION.—Mr. Macfarren's delightful *Opera di' Camera*, "Jessy Lea," having greatly pleased the inhabitants of the "home counties," is now going upon another provincial tour. This Saturday is mentioned as the last evening on which the operetta can be given. Mr. and Mrs. German Reed have added to the "Pyramid" an allegorical, musical, and tercentennial *séance*, entitled "The Bard and his Birthday," written by Mr. W. Brough. It gives Mrs. Reed the opportunity of singing very charmingly several songs, in which she pleased playgoers some few years ago.

THE SCOTTISH NATIONAL MEMORIAL OF THE PRINCE CONSORT.—A meeting of the acting committee for promoting this memorial was lately held at Edinburgh, under the presidency of the Duke of Buccleuch. His Grace reported that her Majesty had been pleased to name a small committee of advice to assist her with their council in the matter, and had already decided that Edinburgh, as the metropolis of Scotland, was the most appropriate place for a Scottish national memorial. The committee consisted of the Lord Provost of Edinburgh, the Right Hon. Sir Wm. Gibson-Craig, the Right Hon. Sir John M'Neil, Sir John Watson Gordon, president of the Royal Scottish Academy, Dr. Lyon Playfair, and himself. It was resolved to wait the further expression of her Majesty's wishes as to the site and nature of the memorial. The fund amounts to 13,000*l.*

MONUMENTAL.—Viscount Combermere paid a visit recently to Chester, accompanied by Baron Marochetti and other gentlemen, and inspected the proposed sites for the equestrian statue of his lordship. The plot of ground just outside the castle gates was preferred.——The *Semaine Catholique* of Montauban (Ile-et-Vilaine) mentions that the friends of the Holy Land, who are exceedingly numerous in France, intend to erect on Mount Carmel a colossal statue of the Virgin. A French monastery has been built on the summit, and the bones of the French soldiers who were killed at the siege of Saint-Jean-d'Acre repose there.

PUBLIC IMPROVEMENTS AT HEXHAM.—Besides the projected town-hall and corn-market, steps have been taken towards erecting a large reservoir on the outskirts of this borough; and arrangements have been completed for furnishing the town with an ample supply of water. The reservoir will be filled principally with Tyne water, by intercepting one of the streams tributary to the Tyne; and the promoters will thus be able to store up a supply of 70,000,000 gallons. The cost is estimated at about 12,000*l.* In other parts of the town various public improvements and sanitary measures are being carried out, mostly by the Local Board of Health.

IMPROVEMENTS IN INVERNESS.—Contracts have been entered into for the completion of Union-street. The whole undertaking will be finished by Whitsunday, 1865. The total cost of the buildings will be about 50,000*l.*, of which the original projectors contribute about 40,000*l.*, the remaining cost being for the public hall, the Bank of Scotland, and the United Presbyterian Church.

VENTNOR.—Mr. John G. Livesay, architect, has been selected surveyor to the Local Board of Health. The opposition to the adoption of the Local Government Act has been quashed; and the Board, we hear, are determined to carry out, immediately, the sanitary improvements authorised by this Act.

THE THAMES EMBANKMENT.—This great and interesting work is rapidly advancing. It is said that the Duke of Buccleuch, having abandoned all idea of occupying the costly mansion he has just completed, is anxious to let it for Government offices.

SOCIETY FOR THE ENCOURAGEMENT OF FINE ARTS.—On the 6th instant Mr. H. Otley delivered a lecture on the subject of the "Report of the recent Commissioners on the Royal Academy." He contended that the continuance of the Royal Academy in the exercise of its three several functions as dispenser of honours, art teacher, and exhibition proprietor, was inconsistent with the true interests and becoming position of art in this country; and that, leaving to them the appropriation of honorary distinctions, the Government ought itself to take the other two matters in hand, providing ample funds for education in art, and for the exhibition, upon a liberal principle, of the works of artists, without reference to the prestige or claim of those holding academic degrees.

THE LATE MR. F. W. DELAUNAY, ARCHITECT.—The people of Bradford will hear with regret of the death of Mr. Delaunay, architect, of this town. He was a native of Manchester, and during the earlier period of his life was educated in France, and was afterwards articled to one of the first architects in Manchester. Such buildings as Messrs. Milligan & Forbes' stuff warehouse, the bank of the Bradford Banking Company, the enlargement of our infirmary, and the different railway stations between Bradford and Colne, together with many gentlemen's residences in this town and neighbourhood, all of which had their origin from the firm to which he belonged, show he was master of all the different styles of architecture. He came to Bradford about twenty-five years ago, and has, during that period done much towards beautifying our good old town.—*Bradford Observer.*

THE SANITARY STATE OF BELPER.—Six or seven lying with fever in one house is no novelty in Belper, says the *Derbyshire Advertiser*, nor yet is it considered anything very extraordinary for a family of six to be reduced to three in the alarmingly short space of three or four days. There is in existence a sort of Nuisance Removal Committee, but what benefit that committee is to the town is as yet unknown. It is not over pleasant to examine and inspect the nuisances existing, and the post of sanitary officer would be anything but enviable; still the town ought not to be allowed to fall into this deplorable condition. There ought to be appointed a sanitary inspector to redeem Belper from its present lamentable state. The same paper says,—We can assert, without the slightest hesitation, that the habitations of the major part of the population of Belper are unbecoming Christianity, and unfit for human beings to dwell in. The stench upon visiting some of these localities is really unbearable, and, most indubitably, highly injurious to public health.

BRICK-MAKING AT SWANAGE.—Stone quarrying and stone masonry have seemed to be almost the trade and occupation of the great bulk of the inhabitants of the town of Swanage, says the *Dorset Chronicle*, but now the whole machinery and operations of brick-making are in full work in a field not far from the beach. What with road-making, brick-making, and building about to be commenced, the place will be for some time a scene of trade, life, and activity. Sites for building are being obtained from Mr. J. Mowlem and Mr. G. Burt, and there is plenty of good stone close at hand at moderate prices.

UPTON-ON-SEVERN: SURVEYOR.—At a meeting of the Board of Waywardens, Mr. John Stephens, of Colwall, was elected surveyor of this highway district, at a salary of 150*l*. Mr. Stephens has had many years' experience in the construction of railroads, &c., under Mr. Ballard and other eminent contractors. The candidates for the office were reduced to two, Mr. Stephens and Mr. C. T. Ireland.

ARCHITECTURAL MUSEUM.—We are asked to mention that in consequence of the severe illness of Mr. J. H. Parker, who had kindly undertaken to lecture at the Architectural Museum, on Tuesday, June 7th, there will be no lecture on that evening. Mr. Parker has been in great danger.

BRIDGING NIAGARA RIVER.—A bridge is to be built over Niagara river at Buffalo, to connect with Canada, at a cost of 1,000,000 dollars. Over 300,000 dollars have been subscribed towards it.—*Canadian paper.*

SOUTH KENSINGTON MUSEUM.—Lord Granville has invited a large and distinguished party to the South Kensington Museum for this Thursday evening, to meet T.R.H. the Prince and Princess of Wales.

PATENT-OFFICE LIBRARY AND MUSEUM.—In the Commons last week, Mr. Dillwyn moved for a select committee to inquire as to the most suitable arrangements to be made respecting the Patent-office Library and Museum. Mr. Cowper said that a commission was now sitting, considering the entire subject, and it was expected that their report would soon be laid before the House. He therefore could not agree to a committee. The Attorney-General also thought it would be highly desirable to wait for their report. The House then divided, and the result was:—For the motion, 21; against it, 16. Majority for the motion, 5.

ROYAL ITALIAN OPERA HOUSE.—The return of Madlle. Patti, on Saturday last, to the scene of her first successes in England, induced what has been lately wanting amongst the *habitués* of Covent Garden,—some enthusiasm. She sang, as Rosina, brilliantly and piquantly as ever, and the rest of the opera was exceedingly well executed. The audience here have a great regard for old favourites, and, truth to say, the difficulty with which anything better is found may well make them so. "The Merry Wives of Windsor" will not be produced after all; and, judging from its very middling effect at the other house, we cannot say that we are sorry for it. Flotow's "Stradella" is in rehearsal, and will be given in lieu, with Signor Wachtel in the principal part.

THE HAYMARKET THEATRE.—All doubt as to the great ability of Mr. Sothern as an actor, entertained by some, notwithstanding the success of "Lord Dundreary," must be removed by his performance in the new piece, "David Garrick." More excellent acting has not been seen for some time. Mr. Buckstone gives force to a small part, and Miss Nelly Moore plays the daughter with grace and feeling. The whole makes a legitimate and increasing success.

PUBLIC HALL FOR DARWEN.—At a meeting held recently in Darwen, it was decided to form a company, with limited liability, for the erection of a public hall in that town. The cost will be about 10,000*l*.

TENDERS.

For three new warehouses, Wood-street, Cheapside. Mr. Robert W. Edis, architect. Quantities supplied by Mr. W. R. Gritten:—

Mansfield & Son	£6,640	0	0
Myers & Sons	6,465	0	0
J. & C. I'Anson	6,460	0	0
Brass	6,429	0	0
Piper & Wheeler	6,244	0	0
Lawrence & Sons	6,182	0	0
Brown & Robinson	6,150	0	0
Hardiman & Sandon	6,147	0	0

For the ironwork of an iron railway bridge, across the River Lugg, near Hereford. Messrs. Curley & Kempson, engineers:—

Carter	£396	10	0
Cliff	332	0	0
M'Kenzie & Co. (accepted)	287	0	0

For the erection of the new building, Addenbrooke's Hospital, Cambridgeshire:—

Smith & Co.	£14,279	0	0
Holland & Hannen	14,848	0	0
Mansfield & Son	14,700	0	0
Jackson & Shaw	14,015	0	0
Bell & Son	12,247	0	0
Thoday & Clayton	10,975	0	0

For house, in the Anerley-road, Sydenham, for Mr. T. Drew. Mr. George Truefitt, architect:—

Messrs. Warne (accepted)	£831	0	0

For residence for Mr. Robert Standerwick, Tufnell Park. Mr. W. Allen Dixon, architect. Quantities supplied:—

Scrivener & White	£1,520	0	0
Manley & Rogers	1,443	0	0
Patman & Fotheringham	1,428	0	0
Sharpington & Cole	1,413	0	0
Holmes (accepted)	1,406	0	0

For the erection of two houses and shops, at Landport, Hants. Mr. Hendy, architect. Quantities supplied:—

Ward & Son	£1,394	0	0
Buckhurst	1,375	0	0
Gain	1,344	0	0
Duffett	1,285	0	0
Burbidge	1,278	0	0

For new additions and alterations to the shop and premises of Mr. Nye, at Handcross, Sussex. Mr. J. F. Mathews, architect. Quantities not supplied:—

Cook & Turner	£1,631	0	0
Cooke	1,408	0	0
Gates	1,336	0	0
Thornton (accepted)	1,124	0	0

For additions and improvements to Garendon Hall, near Leicester, exclusive of timber, for Mr. A. Phillips de Lisle. Mr. Pugin, architect. Quantities supplied by Mr. S. E. Marples:—

Ife	£10,300	0	0
Herbert & Son	7,798	0	0
Hallam	6,985	0	0
Lilley & Elliott	6,798	0	0
Gascoyne (accepted)	5,660	0	0

For the erection of warehouses, in Great Winchester-street, for Messrs. Waterlow & Sons. Mr. J. N. Randall, architect:—

Hardiman & Sandon	£11,915	0	0
Mills & Sons	11,784	0	0
Holland	11,472	0	0
Mansfield	11,364	0	0
Jackson & Shaw	11,260	0	0
Cubitt	11,170	0	0
Piper & Wheeler	11,150	0	0
I'Anson	10,878	0	0
Robinson	10,823	0	0
Lawrence & Sons	10,732	0	0

For the erection of three warehouses, in Wood-street and Milk-street, for Mr. W. Haynes. Mr. R. W. Edis, architect:—

Mansfield	£6,640	0	0
Myers & Sons	6,465	0	0
I'Anson	6,460	0	0
Brass	6,429	0	0
Piper & Wheeler	6,244	0	0
Lawrence & Sons	6,182	0	0
Brown & Robinson	6,150	0	0
Hardiman & Sandon	6,147	0	0

For completion of the Catholic church, Mount St. Mary, Leeds. Mr. Pugin, architect. Quantities supplied by Mr. S. E. Marples:—

	Shell.	Finishings.	West Entrance and Gallery.
Boothman	£4,560	£942	£686
Winn & Pawson	4,438	893	658
Glaister	3,268	966	601
Britton	3,367	609	450
Nicholson & Son	3,082	516	828

For new warehouses, 28, St. Mary-at-Hill, Eastcheap. Messrs. John Young & Son, architects:—

Carter & Son	£5,157	0	0
Ashby & Sons	4,930	0	0
Myers & Son	4,922	0	0
Lawrence & Sons	4,732	0	0
Browne & Robinson	4,687	0	0
King & Son	4,600	0	0
Hart	4,590	0	0
Brass	4,403	0	0
Conder	4,400	0	0
Hill & Son	4,350	0	0

For building three warehouses, at Bermondsey, for Mr. W. J. Clift. Mr. Josh. Peacock, architect:—

Lugg	£9,130	0	0
Wells	9,036	0	0
Carter & Sons	8,740	0	0
Piper & Wheeler	8,642	0	0
Conder	8,268	0	0
Macey	8,139	0	0

For alteration to Wesleyan Chapel, Stoke Newington. Mr. Pocock, architect:—

Clements	£1,037	0	0
Piper & Wheeler	1,025	0	0
Reed	995	0	0
Pritchard	931	0	0
Dove, Brothers	905	0	0

For building a pair of semi-detached residences, at Tunbridge Wells, for Mr. George Hills. Mr. W. Bond, architect:—

Mercer & Cornfield (accepted)	£1,255	9	0

For building a lodge, at Langton, near Tunbridge Wells, exclusive of bricks and tiles, for Mr. George Barrett. Mr. W. Bond, architect:—

Peerless & Hartridge (accepted)	£200	0	0

For excavating and building a large circular tank for a gasholder, for the Bath Gas Company:—

Bladwell & Ambrose	£2,790	0	0
Aust	2,000	0	0
Mann	1,989	0	0
Mitchell (accepted)	1,835	0	0

For village church, Clack, Wilts. Mr. C. F. Hansom, architect. Quantities supplied:—

Gane & Co.	£2,358	0	0
Wilkins	2,331	0	0
Morris	2,100	0	0
Aust & Tinson	2,060	0	0
Drew	1,956	0	0
Chinnock	1,858	0	0
Beszant & Salway	1,836	0	0
Lewis	1,814	0	0
Stephens	1,682	0	0
Pinniger (accepted)	1,660	0	0

For alterations and reperations to a house, in Harleyford-place, Kennington, for Mr. T. R. Apps. Mr. W. Sim, architect:—

Sykes	£318	0	0
Tye & Andrews	271	0	0
Fish	261	0	0

For alterations and additions to Lyndon Hall, Rutland, for Mr. E. N. Conant. Mr. E. Browning, architect:—

		Value of Old Materials re-used.
Halliday & Cave	£10,137	£592
Bradshaw & Perkins	10,119	1,404
Jeffs & Roberts	9,032	960
Richardson & Son	9,895	919
Thoday & Clayton	9,359	303
Ruddle & Thompson	9,187	—
J. W. Thompson	8,951	245
Timms (accepted)	8,500	850

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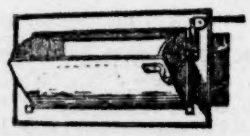
Sheringham's Day and Night Ventilator  for the admission of Pure Air.

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